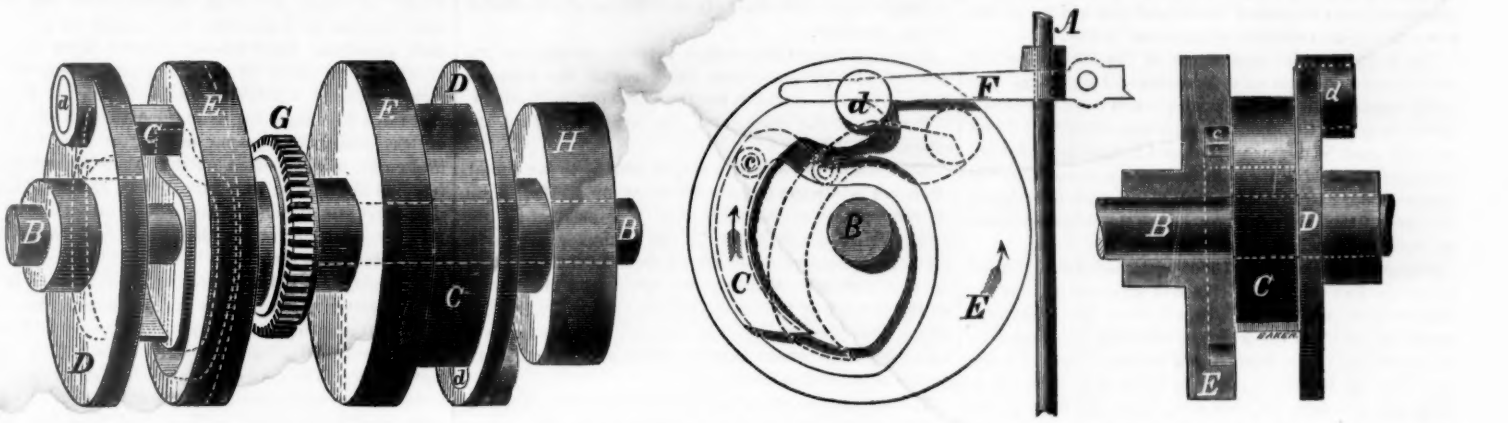
RAILROAD GAZETTE

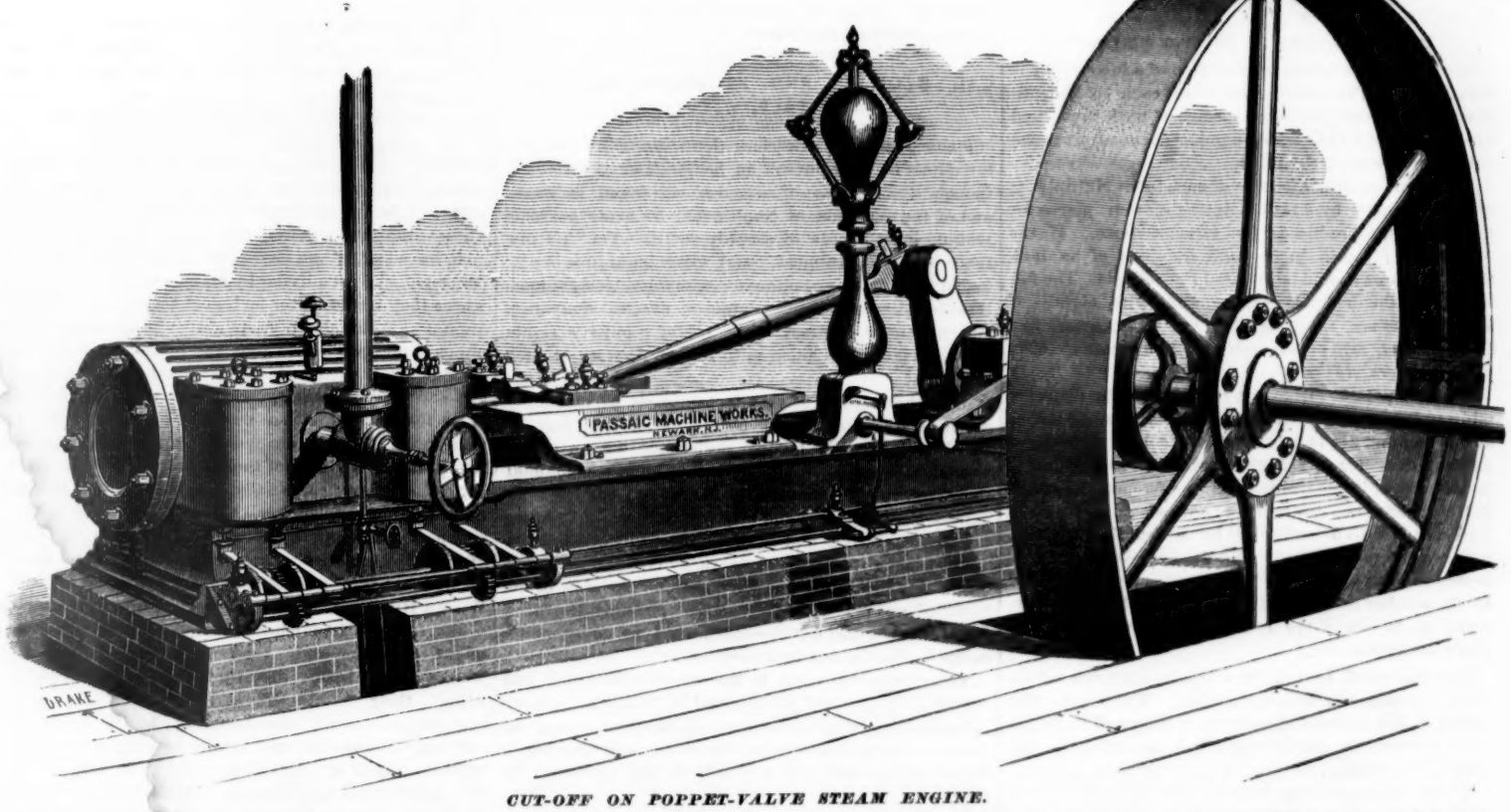
SATURDAY, APRIL 15, 1871.

CUT-OFF FOR STEAM ENGINES.

At the Passaic Machine Works, at Newark, New Jersey, there has been built lately a number of stationary engines, with the cut-off shown in the engraving below. Four separate valves for steam and exhaust ports are operated by cams attached to a transmission shaft, *B*. The valve-lifting rods are alternately elevated and allowed to drop by bearing on the cams as the shaft revolves.

For operating the exhaust valves, solid cams, *H*, of the proper pattern are fixed on the shaft.





CUT-OFF ON POPPET-VALVE STEAM ENGINE.

The cams operating the steam-admission valves each have a wrist pin, *d*, bearing in the fixed wrist plate, *D*. The position of these cams is also varied by a pin, *c*, provided with an anti-friction roller, and running in a cam-shaped groove cut in the disc, *E*, which is loosely attached to the shaft and geared to the governor. The action of the governor varies the position of the disc (which remains nearly stationary) so that the cam withdraws and allows the valve-rod to drop earlier or later in the stroke; while, since the wrist plate is fixed on the shaft, the wrist pin, in all variations of the cut-off, raises the valve rod at the same moment to begin the stroke. Thus the time of admission of steam to the cylinders is varied by the governor with perfect accuracy, from cutting off entirely to a full stroke.

It will be seen, from an examination of the diagram, that almost any conceivable motion may be imparted to to the valve rod by such a combination of two cams as is shown. With cams of the form represented, the valve rod is suddenly lifted to its full height and there retained at rest, at full port opening, while the steam is admitted through the valve passages.

Two large engines, with this cut-off, built by Messrs. Watts, Campbell & Co., in 1867 and 1868, have been running since that time, and have given excellent satisfaction. The address of the inventor, Mr. Julius Hornig, is No. 19 South Wells street, Chicago.

SIMPLE RULES FOR LOCOMOTIVE ENGINEERS AND MACHINISTS.

[Continued from Page 14.]

TO CALCULATE THE CAPACITY OF A BOILER.

The shape of a locomotive boiler is made up of a great number of geometrical forms, the exact calculation of all of which would be very laborious. To calculate, however, within one or two gallons, the capacity of a boiler, is not a difficult task. Every essential dimension, or such as are referred to in the following rules, must be first carefully procured, either from the boiler or from a correct plan thereof. Every dimension taken should be reduced to inches.

The first step in the calculation is then to find the area of water section from the whole cross section of the boiler. That is, to know how much of the end area of the boiler is covered by water, in distinction from that occupied by tubes and by the steam room. If the boiler is of uniform diameter throughout, we calculate upon a circle equal to that diameter. If it tapers uniformly from the fire-box to the smoke-box, we take the diameter at a point midway between the two ends.

To understand the calculation fully, it is best to draw, to any scale, a circle representing the diameter of the boiler. Then, to the same scale, draw a line at the proper position of the water level, previously obtained by measurement of the height of the upper gauge-cock from the center of the boiler. It must be remembered that all the tubes are below this line, although it is not necessary to draw them in their places. We have thus before us the shape of the figure or portion of the cross section of the boiler whose area is to be found.

Draw a line through the center of the circle and parallel to the water line. The portion below this line will be one-half of a whole circle, whose area may be found by a table of areas, or by our rule, previously given.

The areas of that portion between the center line and water line is now to be found.

Our own method of procedure would be as follows:

Draw two radiating lines from the center of the circle meeting the circumference at the ends of the water line. This would divide the figure into three portions, two of which are equal to each other. The area of the central portion of the figure would be equal to the product obtained by multiplying the distance of the water line above the center into half the length of the water line. The area so found is to be placed under that of one-half of the circle, already found. To get the area of each of the two segments, between the radial and center lines, we should first measure the angle included between the center line and one of the radial lines. This would be done by an ordinary brass protractor, which goes with the common cases of drawing instruments.

As there are 360 degrees in a circle, the area of the two segments is in the same proportion to that of the whole circle as the sum of the degrees in the two segments is to 360 degrees. Therefore, to find the area of the two segments, multiply the area of the entire circle, as already found, by as many degrees as there are in both segments, taken together, and divide the product by 360. Place the area so found under the two areas already reserved, and add the three together. Their sum is the area of that portion of the circle below the water line. The areas of the ends of all the tubes are to be deducted from this area.

Find the area of the circle of the outside diam-

eter of the tubes, and multiply it by the number of tubes. Subtract the product from the whole area of that portion of the circle below the water line.

The remainder, thus found, is the area of water cross section of the boiler, expressed in square inches.

This area is now to be multiplied by the length of the barrel of the boiler, in inches. The product is the cubic or solid inches of water lying in front of the outside fire-box, and is to be reserved for future use.

We must now multiply together the depth, average width and the thickness of each water space around the fire-box.

The widths must be taken so as to include the space in each corner, by taking the widths of two parallel spaces between the outer sheets and the widths of the two other spaces outside of the inner sheets.

The length, width and depth of the body of water over the crown sheet must be multiplied together. The solid inches in all the water spaces and over the crown are to be added together,and their sum reserved. From the sum must be deducted the solid inches occupied by the tubes in passing through the front water-space; the tube content already deducted being that only lying forward of the outer fire-box. Also the room occupied by the door opening, crown bars and stay bolts.

Some builders use an oval door with a solid ring riveted in the fire-box around it. We will suppose it to be 1½ inches thick all around. To calculate the space thus taken up, multiply the width of the door, plus 3 inches, by the height of the door, plus 3 inches. That is, if the door is 11 by 15 inches, multiply 14 by 18 inches. Multiply the product by .7854, and point off four places for decimals. This last product, multiplied by the thickness of the water space, gives the solid inches occupied by the door.

Having collected all the separate quantities, or solid inches, and made all the deductions for fixtures inside of the boiler, the grand remainder will represent the solid inches of water room up to the third gauge. This remainder is to be divided by 1728, for cubic feet, and by 231 for wine gallons.

THE CALCULATION OF HEATING SURFACE.

The calculation of the tube surface of a locomotive is very simple. The circumference of each tube, multiplied by its length, gives the surface of each tube; and this multiplied by the whole number of tubes, gives the entire surface of all the tubes.

To obtain the circumference of each tube: Multiply its outside diameter by 3.1416, pointing off four places for decimals; the product is the circumference. If the diameter is given in inches and fractions of an inch these fractions should be reduced to decimals. The following are the decimals corresponding with eighths of a whole number. One-eighth, .125; one-quarter, .25; three-eighths, .375; one-half .5; five-eighths, .625; three-quarters, .75; seven-eighths, .875.

If the tube tapers from end to end, take the diameter midway between the extreme diameters. A tube 2 inches at one end and 2¼ inches at the other has a mean or average diameter of 2⅛ inches, and the latter diameter is to be taken in obtaining its circumference. Having the circumference properly expressed in inches and decimals, it is to be multiplied by the length, in inches, between the tube sheets. The product is the square inches in each tube. The latter number now multiplied by the number of tubes, gives the square inches of external surface in all the tubes. This divided by 144 gives the square feet.

It is not usual to take the inside diameter of the tubes, in estimating heating surface. The conducting power of the material of the tube is supposed to transmit the entire amount of heat which the tube can absorb to the outside, where it is given off to the water.

To obtain the heating surface of the furnace is also very simple, but the deductions for such portions of this surface as are not in contact with the water must not be neglected. "Heating surface" is to be considered in the exact sense implied by the term—surface usefully employed in heating the contents of the boiler. The whole interior surface of a furnace is best found by first taking the whole distance from the grate, up one side of the furnace, across the crown, and down the other side, to the grate again, and multiplying the distance by the length of the furnace. The product gives the area of the two sides and the crown. Taking all the distances in inches, the product will be expressed in square inches, and must be set aside for future use.

The tube-sheet and door-sheet sides (both of the same area) are to be estimated by multiplying the height above the grate by the average width. The side sheets of the furnace often ascend perpendicularly, for two or three feet, and then deflect outwards and ascend again to the crown. In this case, the tube sheet should be divided in three portions. The lower portion will be a rectangle, or square-cornered figure, extending upward to the point where the side-sheet commences to deflect outwards. The upper portion will extend from the crown down to where the side-sheet bends inward. The middle portion includes the irregular figure, whose average width is to be taken. These divisions of the surface must be obtained by measurement of the furnace, or an accurate plan thereof. In case a combustion chamber is used, the surface must be found by rules already given, viz:—diameter multiplied by 3.1416, by the depth, and divided by 2 (as only one-half of the chamber is of cylindrical form). The portion above the diameter is generally perpendicular and forms a rectangle. Measure this height from the diameter across the crown and down the other side to the diameter again, and multiply this distance by the depth of the chamber.

Having obtained the entire interior surface of the fire-box, by adding together the areas of the separate sides, it is to be reserved for the following deductions:

The size of the door, and the end area of all the tubes.

The area of the end of a single tube is to be found. (*Rule*—Multiply the outside diameter by .7854; point off four places of decimals; the last product is the area. Fractions of inches in the diameter are to be taken in equivalent decimals, as given in the beginning of this article.) Multiply the area of a single tube by the number of tubes, and add the whole area to that of the door-opening, already found. The sum is to be taken from the whole interior surface of the fire-box, previously found and set aside.

The net area or actual heating surface of the fire-box, now in square inches, is to be divided by 144 for square feet.

The area of the grate is the product of the length and width of the furnace measured at the level of the grate-bars. Being found in square inches, it is to be divided by 144 for square feet, as in other surfaces.

The tube surface, fire-box surface and grate area are considered to represent the heating capacity of the boiler, and are the terms in which the size of the boiler is most definitely expressed.

CAR BEGGARS AND SPONGERS—CAR-HOSPITALS, ETC.

Pleasure-seeking travelers don't generally look for the object of their pursuit in hospitals or pest-houses, though descriptions of morgues, as found in Paris, and of the dead-pits of Naples, may be made passable reading in the hands of a ready writer. Yet "'tis distance lends enchantment," and utter ignorance is preferred to personal acquaintance with the subjects named. Unrelieved misery repels, while it excites sympathy, and we *give*, sometimes, to be rid of repulsive sights and associations as much as to relieve distress in a fellow being.

And a knowledge of this fact imparts to mendicity much of its potency and power, a patched and ulcered scalp always having preference with a crowd over sightless orbs, or silent tongues, however eloquent their appeal. We simply pity the latter; but the first-named excites horror and pity too, and we make haste to relieve ourselves and it, the soonest way possible.

The beggar's commercial "corner" is thus formed and found, and the public has its "option" to give or be horrified and pestered *ad libitum*—or possibly disgraced for parsimony and heartlessness, amid so many incitements to charity and brotherly love.

At any rate, the *train* is the recognized sluice and run-way for any and all the real or simulated misery of the land, and if one desires to *realize* the phantasmagoric dream of an opium-eater, he has but to pack his satchel, secure a ticket and seat, and wait for the panorama to move.

It will move soon enough; and the lame, halt, blind, deaf, dumb, armless, legless, and deformed in mind, body or estate have a place in this grand phalanx of misfortune, and the beholder all the opportunity desired for diffusing hissympathy and his six-pences, and affording the relief sought for.

To be sure, the giver may have lands, money, and bonds, and much wealth, and be a large payer of taxes of all sorts, and may very well know that public institutions thus sustained by his involuntary munificence are ample for all the necessities of these poor unfortunates; still, he gives—because importuned, and to be *rid* of importunity, and thus becomes *particeps criminis* to his own and the wrongs of the entire body-politic.

It would be a novelty, sure, if, while seated in church and listening to the harrowing clang of the organ voluntary, a bevy of beggars, the impotent and impudent too, might be let loose upon us to insist on an excise or tribute before moving an inch further toward the "better land." But if earthly journeys may be thus intercepted, why not the more important undertaking also? and if under obligation, or impulse, to give *ever* should not our charities be the more generous and beneficent while our hearts are being weaned from earth and set on possessions never to be invaded by others or diminished by our own use? And if permitted freedom any where, should not the mendicant expect it of church wardens and vestry, rather than of the railroad official, whose duty ends with justice and proper politeness to those temporarily under his care?

The suggestion simply explodes the entire theory and practice: Beggars, verse-venders, fiddlers, acrobats, and their like, should all be excluded from cars in which they are not passengers as inexorably and positively, as they are from congregations which they only purpose to importune and pester in the way of their vocation. They are all intruders upon the rights of others, and many of them impostors, entitled to no encouragement whatever, and quite as much out of place in a passenger car as in the cathedral of a bishop, or less pretentious prayer-meeting of a parish. And brakemen, who so often obtrude their unwelcome attentions upon those who have tickets, should have positive orders to exclude those whose intention it is to ride the passenger rather than the vehicle upon which they presume to intrude.

Eleemosynary aid thus sought is not needed, in view of far better provision for all the necessitous; it is vexatious and unjust to the really benevolent often, and to the recipient, degrading and demoralizing to the last degree. The man or woman who deliberately elects to become a beggar has already left the region of sympathy and benevolence and entered upon the land of trick and imposture, and speedy arrest and confinement is a greater kindness to either than the most princely munificence of bread and board. They, at least, should not be helped along by public corporations in any proposed foray upon private rights or possessions, as aid thus extended only tends to degrade the individual and enhance the measure of crime, misery and public taxation.

There is a still milder type of car annoyance which invites notice and needs removal or reform. The people engaged therein don't ask you for money or personal assistance—only your *attention* while they essay to correct your errors and get you upon *their* track to future safety and felicity. They assume a sort of infallibility on their part, that truth with them is an ascertained quantity, and that it is their prerogative to impart, as it is yours to receive whatever may be offered. These unfortunates, like the verse-dispensing blind-men, have lost, if not the sense of sight, the sense of propriety, and get a living by making themselves odious where they would better be less conspicuous. We who are not so fortunate, perhaps, may have settled upon opposite polemic conclusions and prefer not to be catechised or corrected by these self-elected reformers, and are entitled to immunity therefrom while quietly pursuing the calls of either business or pleasure, for the time being. But the chances are, that if quiescent and non-resistent, a victim of these lunatics will be persecuted the more; as, usually, they make up in zeal and persistence for whatever their theories may lack in common sense and consistency. They are incapable of appreciating the true proprieties of life and should be directed into quietude and their proper position. Were a Huxley, a Spencer, or an Emerson infused with a like zeal for imparting knowledge, their fellow-men might rejoice and receive gladly. But deep waters are least disturbed by floods, and to enjoy their strength and purity, we must seek them; while the babbling brook comes to our very boot-soles, and, while seeking communion, imparts miasm and dirt, and, may be, an embryo lizard, which, once lodged in the system, remains there—as does delusion in the mind—until that which it feeds upon is destroyed quite.

But a consideration of the case of the lame, dumb, impotent and deluded (presenting only so many phases of human mi-fortune and infirmity), suggests and opens up a still wider field for discussion, and possible action, upon which we can now merely glance.

The locomotive has changed the face of nature—so to speak—more than any device of man, since he was told to go forth, subdue, possess and replenish the earth. The world is not what it was to man, even fifty years ago. It is subdued, contracted, and more within our grasp; and nothing on its surface seems foreign to us, so completely have we "all things to enjoy."

But the golden barge of Egypt's queen might have had cock-roach and centipede concealed beneath the drapery of its magnificence; and while glorying in the luxuries, speed and splendors with which we compass vast divisions of time and space, do we remember that evil as well as good is often expeditious; that disease and death may travel by the same train by which we

are promised gladness and satisfaction without alloy or limit?

We have all become "citizens of the world," yet subject to disease and decay, as ever; and whenever sick or wounded, our first impulse is for the old home, wherever that may be. Then, if ever, we desire ease and speed, and the car is sought as our only hope and ark of safety. And for the distressed stranger, what device so welcome?

But individual benefit is not uniformly a public blessing; and the fleeing invalid *may* become worse than "fire-brands, arrows and death" to an entire community. Unrestrained intercourse might possibly be freighted with too many perils to make it desirable, even if tolerable.

Railroad managers have already given us the "smoking-car" and the "ladies' car," neither of which were called for by any great public necessity; but the INVALIDS' CAR seems never to have been thought of by any one. And yet, is not this suggested by an exigency that many have observed and all will endorse as valid? It is often desirable for sick people to travel; but how very repulsive to observed and observer for the afflicted to be consigned to the common receptacle of the crowds who may be moving in the same direction!

But the "invalids' car," if properly constructed, would obviate all this. Let it be cut up into sections and isolated compartments, furnished with lounges, easy-chairs, and all necessary comforts of the sick-room, and physician and attendants, etc., etc., if deemed best, and the terrors of a homeless illness will be much diminished.

Families with measles, whooping-cough, and other contagious diseases could thus travel in comfort, and not be spreading terror and disaster wherever they might go. And how very welcome such isolation to the poor consumptive, often abroad and fleeing from death, and desiring that *rest* which to find in a crowded car is impossible. Such comforts might augment expenses a trifle, but who can estimate the individual satisfaction and the public safety thus secured?

The first of our "main lines" to inaugurate the innovation and improvement will find its passenger traffic speedily enhanced thereby, and itself the focus of an earnest and boundless public gratitude.

IRON POINT.

Papers on Iron and Steel.

BY W. MATTIEU WILLIAMS.

III.—THE BESSEMER PROCESS (CONTINUED).

Returning to the Bessemer flame, we now reach what I have described as its second stage, when its dimensions and brilliancy reach their maxima. We know that carbon must be burning there, and in no small quantity. The average of above three per cent. shown in the analysis, gives in a charge of six tons more than 3.6 cwt. of carbon, requiring for its complete combustion into carbonic acid nearly half a ton of oxygen, or about two tons of atmospheric air. There need be a mighty roar to pour forth all this and the 14 cwt. required for the silicon in the course of about twenty minutes. An interesting problem now presents itself in the whiteness and brilliancy of the flame. It is totally different from the carbonic oxide flame, which is produced by the combustion of carbon, *per se*. Whence comes this whiteness? Is it due to the combustion of iron in addition to that of carbon, to solid particles of carbon, or is there any important quantity of hydro-carbon present?† The latter explanation is forcibly suggested by the appearance of the flame, and is, I think, to some extent, confirmed by the spectroscope. There is still, however, some red smoke above the flame, which, though less abundant now than in some other stages of the blow, is sufficient to indicate that some iron is burning, probably small particles mechanically ejected into the flame by the force of the blast.

It is during this period of the blow that the lines which have been figured and described by Dr. Watts and Dr. Roscoe as the spectrum of the Bessemer flame are most distinctly displayed. The spectrum includes some of the iron lines, the lines of lithium,‡ sodium and potassium, and the red band of hydrogen seen as a black band, besides the very complex series of lines which have been designated "the carbon lines" of the Bessemer flame. These lines probably include a hydro-carbon spectrum—I say "probably," because they do not exactly correspond with the hydro-carbon spectra with which they have already been compared. Nitrogen lines are also displayed, but whether these are due to cyanogen, or to any other compound including carbon and nitrogen, has not yet been determined. What then is the particular compound of carbon which is burning in the Bessemer flame? Is it a hydro-carbon, and if so, with which of the many known varieties of hydro-carbon does it correspond? Do the nitrogen lines belong to any compound of nitrogen whose spectrum may be identified?

These are questions of considerable philosophical and practical interest which I think, the spectroscope may be made to answer. Hitherto, the spectroscopic investigations of the Bessemer flame, though skillfully and laboriously conducted, have been curiously barren of philosophical results, and for practical purposes altogether a failure. If the above questions were answered it would be different.

During the first part of the blow a large proportion of the graphitic carbon of the grey iron becomes converted into the condition of "combined carbon," such as exists

Fig. 1.—"Bombs" Produced in the Bessemer Process.

in steel and white cast-iron. What then is the condition of this carbon if it yields a cyanogen or hydro-carbon spectrum? Nitrogen has been found in considerable quantities in cast-iron which is rich in carbon. Steel makers know that organic compounds containing nitrogen as well as carbon are far more efficacious in cementation than carbon in a state of comparative purity. Thus, bone dust is more effectual for case-hardening than wood charcoal, and ferrocyanide of potassium still more effectual than bone dust. Every steel maker is the proud possessor of a profound secret, a "physic" which he furtively buys from a distant druggist or drysalter, and, having disguised its yellow color by grinding it with lamp black, locks the physic in a strong box and the secret in his own bosom. As this profound secret, like so many others, is perfectly well known to all whom it may concern, I perpetrate no breach of confidence in describing the "physic" as the ferrocyanide of potassium. Its value is unquestionable, but *how* it acts is still a mystery. Some chemists have maintained that a nitride of iron is essential to the production of steel, and others have hinted at the existence of a cyanuret. As we know that carbon exists in the same condition in white iron as in steel, a question of considerable interest is offered for spectroscopic solution, viz.: Is cyanogen burning in the Bessemer flame? Again, we have another set of workshop facts and laboratory experiments which go to show that for the production of steel, hydrogen, in the form of hydro-carbon, is necessary. It is well known that coal gas, paraffin, and other hydro-carbons, are more efficient cementing agents than pure carbon. Dr. Percy found that the charcoal of sugar, which retained some hydrogen or hydro-carbon, readily converted iron into steel, but that the same charcoal failed to produce steel under similar circumstances after it had been deprived of its hydro-carbon. It is well known that wood charcoal which has been several times heated in the cementing furnace, loses some of its power of cementation, and this has been attributed to the driving off of the hydro-carbon contained in the fresh charcoal.

Fig. 2.

Again, it is found that when, by means of an acid, we dissolve the iron of steel or white iron away from its carbon, the residue is not simple solid carbon, but an unmistakable liquid hydro-carbon, an oil which, like other hydro-carbons, burns with a smoky flame. In this case it is possible that the hydrogen may be supplied to the carbon by the water or the acid. If so, it presents an interesting case of the formation of what we usually regard as organic matter from inorganic materials.

If, on the other hand, the hydro-carbon exists ready formed in the steel and the white iron, the conversion of grey iron into white iron, *i. e.*, of graphite into this hydro-carbon, is a still more remarkable case of the same kind.

It is true that the hydrogen may be detected by a direct combustion analysis, but this does not reveal the mode of its existence. The information thus afforded is analogous to what we obtain by similar means respecting nitrogen.

The last change that occurs in the flame, that which announces to the foreman the time for stopping the blow, requires but little explanation; but it is, nevertheless, instructive, if thoughtfully examined. The contraction of the flame and loss of brilliancy is evidently due to the exhaustion of the carbon. The change which occurs is very similar to that which is observed when air is admitted to a jet from which coal gas is burning.

If to such a jet, supplied with a constant quantity of coal gas, atmospheric air be admitted, so that it shall mix with the gas before burning, the white or luminous portion of the flame will contract in proportion to the quantity of air supplied, and if a gradually increasing quantity of air be admitted, this contraction will progress until the white flame is totally extinguished. Mr. Jonathan Wilkinson, of Grimesthorpe, who has been recently investigating this subject with a view to practical photometric applications, finds that the quantity of air required thus to extinguish the white flame is proportionate to the quantity of carbon combined with the hydrogen, or to the illuminating power of the gas; that for every standard "candle" of illuminating power about 0.2 of air is required. Thus fifteen-candle gas will require three times its own volume of air at the same temperature and pressure, for the extinction of the white flame, seventeen-candle gas 3.4 of air, and so on.

In the case of the Bessemer flame, we have a constant supply of air to a diminishing supply of carbon, and therefore we may expect that there should occur in the white portion of the flame, due to hydro-carbon, a change corresponding to that which would occur in Mr. Wilkinson's photometric flame, if, instead of a constant supply of coal gas mixed with an increasing supply of air, he maintained the air in constant flow and gradually closed the gas-cock. In this case there would not only occur a gradual diminution of the brilliancy, but also of the dimensions of the flame.

Such is the change which takes place in the Bessemer flame towards the end of the blow, and it so far confirms the hypothesis that a *considerable portion* of the white flame is due to hydro-carbon. If it were due to the combustion of iron the white flame should increase towards the end of the blow, for it is then that the iron, when no longer protected by the more combustible carbon, begins to burn in a serious degree, just as I have shown that the full combustion of the carbon takes place after the bulk of the silicon has been oxidized.—*Nature.*

Fig. 3.

The First Proposition for a Railroad in America.

The following is an extract from a biographical sketch of Dr. Abner Phelps, given in the Biographical Annals of Williams College, recently published:

It was during his senior year (1806) that an incident occurred which subsequently led to the first proposition for railroads in America. Mr. Phelps, in reading an article in the Encyclopedia, saw the account of a railroad used at Newcastle, England, to bring coal from the mines and slate from the quarries in Wales. It suggested to his mind the question, why not transport goods and passengers in the same way on common roads? It was often a subject of reflection, and, his father being a member of the Legislature at Boston, he thus wrote, in February 15, 1808: "I see by the papers the Legislature of the State of New York has before it a proposition for a canal from the Hudson River to the great lakes. If they succeed, perhaps we may extend it through this State to Boston. But I believe it will be found that railways are better fitted to the climate and business of this country than canals. I wish you would propose a railway from Boston to Albany. Make it a great State road. The counties make roads, why not let the State make one? This will bring up a subject which ought to be investigated, and people had better talk on such a subject than to be always discussing politics to no profit. Please, sir, to think of it, and if you see it in the same light that I do, you will propose it. Were I in the Legislature, I should not hesitate, but should move it as the first object of attention."

This suggestion was not then acted upon. Dr. Phelps resided a few years at Reading, Mass., where he practiced medicine, and in 1816 moved to Boston. In 1826 Dr. Phelps was elected a member of the House of Representatives from Boston. The Legislature then held two sessions—one a few days in June, to organize, and one in January, for business. On the second day of the session (June 18, 1826), as appears by the journal, an order was offered by Mr. Phelps, of Boston, which was the first proposition ever made for a railroad before any legislative body in our country. An able and elaborate report was written by Dr. Phelps, and presented January 19, 1827. The report was signed by the Chairman and Geo. W. Adams—a son of John Q. Adams—and Emory Washburn, since Governor of the State, and, by a singular felicity, a graduate of Williams College. The report closed with resolves recommending a survey. The Governor, in his annual message, referring to the expected report, said: "Their report "will come recommended by the assurance that their "attention has been perseveringly directed to the interesting object of their commission, and that, short of "the expense and labor of a board of scientific engineers, a better source of authentic information could "not be resorted to by the government."

In the resolves commissioners were appointed and surveys were made for the road. At the request of these gentlemen, Dr. Phelps accompanied them as Chairman of the Legislative Committee, and devoted the summer of 1828 to the work, at his own expense, exploring the whole route on foot and by private conveyance.

Dr. Phelps always predicted, much to the astonishment of his friends, that "the railroad from Boston to "Albany will one day be a street, lighted, and lined "with houses and stores."

Dr. Phelps continued to reside in Boston until 1866, when he moved to Granville, near Boston, where he now lives, in the full possession of his powers of mind and body, at the ripe old age of nearly 92 years.

—The Governor of Massachussetts went down to take a look into the Hoosac Tunnel the other day, and a venerable farmer, if we may credit the Boston *Transcript*, addressed him thus: "I have lived hereabouts, off and on, about forty year, and my opinion is, that ef I was the Commonwealth of Massachusetts, and I hadn't gone into't, I wouldn't go into't. But ef I had gone into't, and got es fur es you hev, my opinion is that I dun'no what I should do about it."

—The traffic receipts of the Great Western of Canada for the week ending March 17 amounted to £17,941, against £14,395 in the corresponding week of last year, showing an increase of £3,546, or 24½ per cent.

† I speak of solid particles of carbon as quite a distinct case from hydro-carbon flame, believing in the soundness of Frankland's conclusion that the brilliancy of a hydro-carbon flame is *not* due to the combustion of solid particles of carbon. My own experiments on the transparency of the *white portion* of common coal gas flames strongly confirm Dr. Frankland's view.

‡ I have only found the lithium occasionally. In many instances I have watched a blow from beginning to end without observing any appearance of the red lithium band which, when seen at all, is so unmistakably brilliant.

RAILROAD LAW.

Common Carrier.—When several carriers are associated in a connected line, if one of them receives goods marked for a consignee at the end of the line and receives pay as for through freight, such carrier is liable for injury done to the goods anywhere on the line—Receiving goods, and giving a check or ticket through imports an undertaking to carry through, and such contract is binding—The Law stated and reviewed.

In the case of *Nashua Lock Company vs. Worcester & Nashua Railroad Company*, the Supreme Judicial Court of New Hampshire has enunciated the principle that:

"When several common carriers all associated in a continuous line of transportation, and, in the course of the business, goods are carried through the connected line for one price, under an agreement by which the freight money is divided among the associated carriers, in proportions fixed by the agreement, if the carrier at one end of the line receives goods to be transported through, marked for an assignee at the other end of the line, and on delivery of the goods takes pay for transportation through, the carrier who so receives the goods is bound to carry them, or see that they are carried, to their final destination, and is liable for an accidental loss happening in any part of the connected line."

The defendant corporations were the Worcester & Nashua Railroad, the Norwich & Worcester Railroad, and the Nashua & New York Transportation Company, who had an agreement for through freights, as above stated. There was no special agreement, written or oral, between the plaintiffs and the defendants that the goods should be carried to New York, nor that the responsibility of the defendants should end on delivery to the Norwich & Worcester Railroad. Notwithstanding the conflicting decisions in various States, the Court holds that Railroads may contract to carry goods and passengers beyond their own lines.

The main defense of the roads was based upon the construction of the word "forwarded," the roads maintaining that it meant to forward to the next party in the line, and not to New York. The Court did not sustain this view. The defendants also urged that it was American law that, in the absence of *positive agreement*, each carrier is liable for loss on his own line, and not for loss on any other part of the connected line. This appears to be the settled rule in Connecticut, and there is one decision to this effect in Maine. This has also been held in Massachusetts. The Massachusetts courts in a very recent case have declined to reopen the question. The rule in England is this: (leading case *Muschamp vs. The Lancaster & Preston Railway*, 8 M. & W. 421), that when a common carrier receives goods marked or otherwise directed for a place beyond the carrier's own line, this alone is *prima facie* evidence of a contract to carry the goods to their final destination, though the freight money for transportation through is not paid to the carrier that receives the goods, and though he is not shown to have any connection in business beyond his own line. This is adopted in Illinois. In England, under such circumstances, the contract is entire with the first carrier alone. This general rule is sustained by many authorities in this country; although there seems to be no State in which it is held that the owner may not come on any carrier by whose fault the loss or damage actually happened. The general theory is, that, in all such cases, there is more or less of a partnership connection. A *quasi* partnership of this character creates joint liability. While the broad English rule has not been adopted in this country, it cannot be said that there is an *American rule*. There is much confusion and great conflict of American authorities. The law of Connecticut is quite anomalous, the courts going so far as to hold that railroads have no corporate authority to contract for the transportation of goods or passengers beyond their own lines—a doctrine which is rejected everywhere else. The weight of authorities greatly preponderates in favor of the principle stated in the caption to this article. The use of steam gives to railroads the main advantages of a legal copartnership, and consequently there seems to be no reason why they should not bear the losses. The bulk of the business of the country is done by associated carriers, and public interest requires an effectual remedy for loss.

This case is of much importance to the business public and the profession. Since a codification of laws is never likely to be reached in this country, it would seem that the possibility of such an extended variety of conflicting decisions can best be avoided by special contracts on the part of common carriers, which shall exactly state the extent to which the first carrier shall be liable for transportation beyond his own line. The English rule in *Muschamp vs. Lancaster & Preston Railway*, 8 M. & W., 421, while having the advantage of definiteness, would cause in many cases such hardships to railroads that it is not likely to be adopted in these States. The surest remedy lies in more careful and specific contracts. We subjoin a classified note of the authorities of this extended opinion:

LAW NOTE—I. *Railroads may contract to carry goods and passengers beyond their own lines.—Hood vs. New York & New Haven Railroad*, 22 Conn., 1; *Elmore vs. The Naugatuck Railroad*, 23 Conn., 457; *The Naugatuck Railroad vs. The Button Company*, 24 Conn., 468; *Muschamp vs. The Lancaster & Preston Ry.* 8 M. & W., 421; *Weed vs. The S. & S. Railroad*, 19 Wend., 534; *The F. & M. Bank vs. The Oh. Transportation Co.*, 23 Vermont, 186; *McCluer vs. M. & L. R. R.*, 13 Gray, 124; *Rogers vs. R. & B. Railroad*, 27 Vermont, 110; *Wilcox vs. Parmelee*, 3 Sandf., 610; *Perkins vs. The P. S. & P. Railroad*, 47 Maine, 573; *Burtis vs. The B. & S. L. Railroad*, 24 N. Y., 369; *Darling vs. The Boston & Worcester Railroad*, 11 Alen., 295; *Quimby vs. Vanderbilt*, 17 N. Y., 312; *Weed vs. The Railroad*, 19 Wend., 534; *The Ill. Central Railroad vs. Copeland*, 24 Ill., 332; *Ill. Central Railroad vs. Johnson*, 34 Ill., 382; *Fog vs. The Troy & Boston Railroad*, 24 Bart., 382; *Schroeder vs. The Hudson River Railroad*, 5 Duer., 55; *Kyle vs. The Laurens Railroad*, 10 Rich. (Law), 382; *The Central Railroad vs. Johnson*, 33 Ill., 382; *The Detroit & Milwaukee Railroad vs. The F. & M. Bank*, 20 Wis., 129; *Angle vs. The Mississippi & Missouri Railroad*, 9 Iowa, 487; *St. John vs. Van Santvoord*, 25 Wend., 680; *Champion vs. Bostwick*, 11 Wend., 591; *Hart vs. The Rensselear & Saratoga Railroad*, *McDonald vs. The Western Railroad*, 34 N. Y., 501, 502.

II. *Construction of "Forwarded."—Wilcox vs. Parmelee*, 3 Sandf., 610; *Schroeder vs. Hudson River Railroad.*, 5 Duer., 55.; *Buckland vs. Adams Express Co.*, 97 Mass., 124.

III. *General Liability Depends on Special Agreement.—Hood vs. N. Y. & New Haven Railroad*, 22 Conn., 1; *Elmore vs. Naugatuck Railroad*, 23 Conn., 457; 24 Conn., 468; 33 Conn., 166; 47 Maine, 573; 1 Gray, 502; 11 Allen, 295; 99 Mass., 220; also, *Burroughs vs. Norwich & Worcester Railroad*, as yet unreported, and *Pendergast vs. The Adams Express Co.*

Baggage Defined.—A gentleman's baggage may consist of clothing for his wife, but not for his landlady.

Plaintiff, being away from home without baggage, purchased in New York a trunk and its contents, which consisted of wearing apparel for himself and his family, material for dresses intended for them, and material for one intended for his landlady. He started to return by defendants' road, and the trunk was received and checked as travelers' baggage. It having been lost, *Held*, that defendant was liable for everything except the material for the landlady. (Lott, J., dissenting; Hunt, J., dissenting as to the material for the dresses.) *Dexter vs Syracuse, Binghampton & New York Railroad Co.*, 42 N. Y., 326.

Lost Trunk.—A carrier that volunteers to deliver a trunk for another carrier on a continuous line is liable for the loss to the extent of the value of the trunk.

Plaintiff was a passenger on the defendants' road, and had lost her trunk while traveling on another. A few days after she had passed over the former, a conductor on the latter delivered the trunk to the defendants' agent, stating the facts, and requesting him to forward it, which he agreed to do. Nothing was said about freight, or whether the trunk should go by freight or passenger train. The trunk having been lost, *Held*, that the defendant was liable for its value. *Wilson vs. Grand Trunk Railway*, 57 Me., 138.

Express Companies.—A railroad company may not grant exclusive privileges to one express company and refuse to take freight from another.

The defendent, a railroad company, whose charter authorized its directors to make rules for the transportation of freight and passengers, one of which was that freight should be carried only on freight trains, contracted with the Eastern Express Company to give the latter a certain space in the baggage car attached to its passenger trains for the carriage of their goods, and agreed not to let a similar space in such a car to any other express company during the continuance of the contract. Plaintiff, another express company, offered packages to be transported upon defendent's passenger trains, when and where the Eastern Express Company loaded their freight, and defendant refused to receive them. *Held*, that plaintiff may maintain an action of damages for such refusal (Cutting and Walton, JJ., not concurring). *New England Express Company vs. Maine Central Railroad Company*, 57 Me., 188.

Negligence.—Passengers have a right to jump from cars to depot platforms.

Plaintiff, a passenger on defendants' railroad, on leaving the cars passed through to the front platform by direction of a brakeman. The train was so drawn up that the steps from this platform were not opposite the station platform, and, in order to reach the latter, she was obliged to jump some distance obliquely. The ground opposite the steps being unfit to step on, she jumped to the platform, fell and was injured. *Held*, that the questions whether the defendent was negligent and whether the plaintiff was guilty of contributory negligence were properly submitted to the jury, and the court was right in refusing to instruct the jury that if there was any danger in the plaintiff's attempt to jump, she could not recover. *Delamatyr vs. Milwaukee & Prairie du Chien Railroad Company*, 24 Wis., 578.

Walking on Track.—Persons do so at their own risk.

Plaintiff's intestate was walking upon defendant's track, 200 feet from a crossing, when he was struck by an engine and killed. The bell on the engine was not rung, nor was the whistle blown, on approaching, for the distance required by statute. *Held*, that the statute imposed no duty on the defendant to a person in the position of the deceased, and that this omission was not as to him negligence. *Harty vs. Central Railroad Company*, 42 N. Y., 468.

The Illinois Railroad and Warehouse Commissioners' Bill.

The following is Hon. A. C. Fuller's bill to establish the Board of Railroad and Warehouse Commissioners, introduced in the Senate February 3, which passed in that body some time ago and this week passed in the House, and received the Governor's approval, and is now a law:

A Bill for an Act to Establish a Board of Railroad and Warehouse Commissioners and Prescribe their Powers and Duties.

SECTION 1. *Be it enacted by the people of the State of Illinois represented in the General Assembly*, That a commission which shall be styled the Railroad and Warehouse Commission shall be appointed as follows: Within twenty days after this act shall take effect, the Governor shall appoint three persons as such commissioners, who shall hold their office until the next meeting of the General Assembly, and until their successors are appointed and qualified. At the next meeting of the General Assembly, and every two years thereafter, the Governor, by and with the consent of the Senate, shall appoint three persons as commissioners, who shall hold their offices for the term of two years from the 1st day of January in the year of their appointment, and until their successors are appointed and qualified.

SEC. 2. No person shall be appointed as such commissioner who is, at the time of his appointment, in any way connected with any railroad company or warehouse, or who is directly or indirectly interested in any stock, bond, or other property of, or is in the employment of, any railroad company or warehouse; and no person appointed as such commissioner shall, during the term of his office, become interested in any stock, bond, or other property of any railroad company or warehouse, or in any manner be employed by or connected with any railroad company or warehouse. The Governor shall have the power to remove any such commissioner at any time, in his discretion.

SEC. 3. Before entering upon the duties of his office, each of the said commissioners shall make and subscribe, and file with the Secretary of State, an affidavit in the following form: "I do solemnly swear (or affirm, as the case may be) that I will support the Constitution of the United States, and the Constitution of the State of Illinois, and that I will faithfully discharge the duties of the office of Commissioner of Railroads and Warehouses according to the best of my ability."

SEC. 4. Each of said commissioners shall receive for his services a sum not exceeding five thousand dollars per annum, payable quarterly. They shall be furnished with an office, office furniture, and stationery, at the expense of the State, and shall have the power to appoint a secretary to perform such duties as they shall assign to him. Said secretary shall receive for his services a sum not exceeding two thousand dollars per annum. The office of said commissioners shall be kept at Springfield, and all sums authorized to be paid by this act shall be paid out of the State Treasury, and only on the order of the Governor.

SEC. 5. The said commissioners shall have the right of passing, in the performance of their duties concerning railroads, on all railroads and railroad trains in this State, free of charge.

SEC. 6. Every railroad company incorporated or doing business in this State, or which shall hereafter be incorporated or do business under any general or special law of this State, shall, on or before the first day of September, A. D. 1871, and on or before the same day each year thereafter, make and transfer to the commissioners appointed by virtue of this act, in Springfield, a full and true statement, under oath, of the proper officers of said corporation, of the affairs of their said corporations, as the same existed on the 1st day of the preceding July, specifying:

1. The amount of the capital stock subscribed, and by whom.
2. The names of the owners of its stock, and the amount owned by them respectively, and the residence of each stockholder, as far as known.
3. The amount of stock paid in, and by whom.
4. The amount of its assets and liabilities.
5. The names and places of residence of its officers.
6. The amount of cash paid to the company on account of the original capital stock.
7. The amount of funded debt.
8. The amount of floating debt.
9. The estimated value of the road-bed, including iron and bridges.
10. The estimated value of rolling stock.
11. The estimated value of stations, buildings and fixtures.
12. The estimated value of other property.
13. The length of single main track.
14. The length of double main track.
15. The length of branches, stating whether they have single or double track.
16. The aggregate length of siding and other tracks not above enumerated.
17. The number of miles run by passenger trains during the year preceding the making the report.
18. The number of miles run by freight trains during the same period.
19. The number of tons of through freight carried during the same time.
20. The number of tons of local freight carried during the same time.
21. Its monthly earnings for the transportation of passengers during the same time.
22. Its monthly earnings for the transportation of freight during the same time.

23. Its monthly earnings from all other sources respectively.
24. The amount of expense incurred in the running and management of passenger trains during the same time.
25. The amount of expense incurred in the running and management of freight trains during the same time, and also the amount of expense incurred in the management of mixed trains during the same time.
26. All other expenses incurred in the running and management of the road during the same time, including the salaries of officers, which shall be reported separately.
27. The amount expended for repairs of road and maintenance of way, including repairs and renewal of bridges, and renewal of iron.
28. The amount expended for improvements, and whether the same are estimated as a part of the expenses of operating or repairing the road, and, if either, which.
29. The amount expended for motive power and cars.
30. The amount expended for station-houses, buildings and fixtures.
31. All other expenses for maintenance of way.
32. All other expenditures, either for the management of road, maintenance of way, motive power and cars, or for other purposes.
33. The rate of fare for passengers for each month during the same time—through and way passengers separately.
34. The tariff of freights, showing the change of tariff during the same time.
35. A copy of each published rate of fare for passengers, and tariff of freight, issued for the government of its agents during the same time.
36. Whether the rate of fare and tariff of freights in such published lists are the same as those actually received by the company during the same time. If not, what were received.
37. What express companies run on its road, and on what terms, and on what conditions; the kind of business done by them, and whether they take their freights at the depots, or at the office of such express companies.
38. What freight and transportation companies run on its road, and on what terms.
39. Whether such freight and transportation companies use the cars of the railroads, or the cars furnished by themselves.
40. Whether the freight or cars of such companies are given any preference in speed or order of transportation, and, if so, in what particular.
41. What running arrangements it has with other railroad companies, setting forth the contracts for the same.

SEC. 7. The said commissioners may make and propound to such railroad companies any additional interrogatories, which shall be answered by such companies in the same manner as those specified in the foregoing section.

SEC. 8. Section 7 of this act shall apply to the president, directors and officers of every railroad company now existing, or which shall be incorporated or organized in this State, and to every lessee, manager, and operator of any railroad within this State.

SEC. 9. It shall be the duty of every owner, lessee and manager of every public warehouse in this State to furnish, in writing, under oath, at such times as said Railroad and Warehouse Commissioners shall require and prescribe, a statement concerning the condition and management of his business as such warehouseman.

SEC. 10. Such commissioners shall, on or before the 1st day of December in each year, and oftener, if required by the Governor so to do, make report to the Governor of their doings for the preceding year, containing such facts, statements and explanations as will disclose the actual workings of the system of railroad transporta ion and warehouse business, in their bearings upon the business and prosperity of the people of this State, and such suggestions in relation thereto as to them may seem appropriate, and particularly, first, whether, in their judgment, the railroads can be classified in regard to the rate of fare and freight to be charged upon them, and, if so, in what manner; second, whether a classification of freight can also be made, and, if so, in what manner. They shall also, at such time as the Governor shall direct, examine any particular subject connected with the condition and management of such railroads and warehouses, and report to him in writing their opinion thereon, together with the reasons therefor.

SEC. 11. Said commissioners shall examine into the condition and management, and all other matters concerning the business of railroads and warehouses in the State, so far as the same pertain to the relation of such roads and warehouses to the public, and to the accommodation and security of persons doing business therewith, and whether such railroad companies and warehouses, their officers, directors, managers, lessees, agents and employes, comply with the laws of this State, now in force, or which shall hereafter be in force, concerning them; and whenever it shall come to their knowledge, either upon complaint or otherwise, or they shall have reason to believe that any such law or laws have been or are being violated, they shall prosecute, or cause to be prosecuted, all corporations or persons guilty of such violation.

SEC. 12. Said commissioners are hereby authorized to hear and determine all applications for the cancellation of warehouse licenses in this State, which may be issued in pursuance of any law of this State, and, for that purpose, to make and adopt such rules and regulations concerning such hearing and determination as may by them from time to time be deemed proper. And if, upon such hearing, it should appear that any public warehouseman has been guilty of violating any law of this State concerning the business of public warehousemen, said commissioners may cancel and revoke the license of said public warehouseman, and immediately notify the officer who issued such license of such revocation and cancellation. And no person whose license as a public warehouseman shall be canceled or revoked, shall be entitled to another license to carry on the business, in this State, of such public warehouseman, until the expiration of six months from the date of such revocation or cancellation, and until he shall be again licensed. *Provided*, that this section shall not be so construed as to prevent any such warehouseman from delivering any grain on hand at the time of such revocation or cancellation of his said license. And all licenses issued in violation of the provisions of this section shall be deemed null and void.

SEC. 13. The property, books, records, accounts, papers, and proceeds of all such railroad companies, and all public warehousemen, shall, at all times during business hours, be subject to the examination and inspection of such commissioners, and they shall have power to examine, under oath or affirmation, any and all directors, officers, managers, agents, and employes of any such railroad corporation, and any and all owners, managers, lessees, agents, and employers of such public warehouse, and other persons, concerning any matter relating to the condition and management of said business.

SEC. 14. In working any examination as contemplated in this act, or for the purpose of obtaining information pursuant to this act, said commissioners shall have the power to issue subpœnas for the attendance of witnesses, and may administer oaths. In case any person shall fail or refuse to obey such subpœna, it shall be the duty of the Circuit Court of any county, upon application for the said commissioners, to issue an attachment for each witness, and compel such witness to attend before the commissioners, and give his testimony upon such matters as shall be lawfully required by such commissioners, and the said court shall have power to punish for contempt, as in other cases of refusal to obey the process and order of such court.

SEC. 15. Any person who shall neglect or refuse to obey the process of subpœna issued by said commissioners, and appear and testify as therein required, shall be deemed guilty of a misdemeanor, and shall be liable to an indictment in any court of competent jurisdiction, and, on conviction thereof, shall be punished for such offense by a fine of not less than $25 nor more than $500, or by imprisonment of not more than thirty days, or both, in the discretion of the court before which such conviction shall be had.

SEC. 16. Every railroad company, and every officer or employe of any railroad company, and every owner, lessee, manager, agent, or employe of said warehouse, who shall willfully neglect to make and furnish any report required in this act, at the time herein required, or who shall willfully and unlawfully hinder, delay or obstruct said commissioners in the discharge of the duties hereby imposed upon them, shall forfeit and pay a sum of not less than $100, and not more than $5,000, for each offense, to be recovered in an action of debt, in the name and for the use of the people of the State of Illinois, and every railroad company, and every officer, agent, or employe of such railroad company, and every lessee, manager, or agent, or employe of any public warehouse, shall be liable to a like penalty for every period of ten days after the time it or he shall willfully neglect or refuse to make such report.

SEC. 17. It shall be the duty of the Attorney-General and State's Attorney in every circuit or county, on the request of said commissioners to institute and prosecute any and all suits and proceedings which they shall be directed by said commissioners to institute and prosecute for a violation of this act, or any law of this State, concerning railroad companies or warehouses, or the officers employed, owners, operatives, or agents of any such companies or warehouses.

SEC. 18. All such prosecutions shall be in the name of the people of the State of Illinois, and all moneys arising therefrom shall be paid into the State treasury by the sheriff, or other officer collecting the same, and the State's Attorney shall be entitled to receive for his compensation, from the State treasury, on bills to be approved by the Governor, a sum not exceeding 10 per cent. of the amount received and paid into the State treasury as aforesaid. *Provided*, this act shall not be construed to prevent any person prosecuting any *qui tam* action, as authorized by law, and of receiving any such part of the amount recovered under any law of this State.

SEC. 19. This act shall not be so construed as to waive or affect the right of any person injured by the violation of any law in regard to railroad companies or warehouses, from prosecuting for his private damages in any manner allowed by law.

Chicago Railroad News.

Lake Navigation.

The navigation of the lower lakes is now fairly opened, and rather earlier, too, than usual. All the lines on Lake Michigan, and between Chicago and Buffalo and Ogdensburg, have already put out boats, and within another week, probably, will have their steamers running regularly according to their schedules. Water communication with Lake Superior is effectually cut off by the closing of the canal at Sault Ste. Marie. The work of deepening and improving the canal is advancing as rapidly as possible, and it is hoped to have it completed by the first of May.

On Lake Michigan the Goodrich Transportation Company have five side-wheel steamers and three propellers now running. Two of these, the steamers Sheboygan and Manitowoc, form the "Lake Michigan West Shore Line," running daily, except Sundays, from Chicago to Milwaukee, Sheboygan and Manitowoc, and connecting with trains on the Milwaukee & St. Paul and Sheboygan & Fond du Lac roads. On Tuesdays and Fridays these boats run farther north, to Kewaunee and Ahnapee. On the "East Shore Line" the steamers Alpena and Muskegon run daily except Sundays, from Chicago to Grand Haven and Muskegon. The steamer Corona runs each week day to St. Joseph. The upper-cabin propellers Navarino, Truesdell and St. Joseph form a semi-weekly line between Chicago and Green Bay, leaving Chicago each Tuesday and Friday, and leaving Green Bay each Tuesday and Saturday, and stopping at all intermediate points on the west shore. The Navarino is an entirely new steamer, and made her first trip this week.

The Chicago & Northwestern's Green Bay & Escanaba line, which is served daily except Mondays by the steamers Saginaw and George L. Dunlap, was opened last Thursday.

The Northern Transportation Company begins the season with twenty-one of its busy little propellers in the water. Twelve of these will run between Chicago and Ogdensburg, leaving Chicago every day except Saturdays and Sundays. The first boat through from Ogdensburg was expected here this week. The boats in this service are the Brooklyn, City of New York, City of Concord, City of Toledo, Lowell, Lawrence, Maine, Milwaukee, Nashua, Oswegatchie, St. Albans and Champlain. Between Cleveland and Toledo and Detroit the company will have nine propellers: Empire, Akron, Cleveland, Granite State, Prairie State, Young America, City of Boston, Michigan and Buckeye.

On the Evans' Buffalo, Erie & Chicago line there are eight steamers: the new iron steamer Alaska, which has her first trip yet to make, the iron steamers Philadelphia and Merchant, and also the Carrie Young, Thomas A. Scott, Bradbury, Hunter and Sun. These boats stop at Erie, Pa., and transfer freight to and from the cars. The "Anchor Line" send their freights by this lake and rail route. At Buffalo the Evans steamers connect with boats on the Erie Canal, and form an all-water route between Chicago and the East. This is the "Western States Line."

The large propellers of the Grand Trunk Line, the Montgomery, B. F. Wade, City of Fremont and S. D. Caldwell, began making regular trips between Chicago and Sarnia on the first of this month. These boats carry the United States mails, and leave Chicago each Tuesday, Thursday and Saturday evening, connecting with the Grand Trunk Railway for Detroit and the Eastern cities.

The Union Steamboat Company have eleven propellers now running between Chicago and Buffalo, in connection with the Erie Railway. One new propeller, the W. M. Tweed, is building and will be in service in a few days. Those already running are the James Fisk, Jr., Dean Richmond, Nebraska, St. Louis, Passaic, B. W. Blanchard, Jay Gould, Roanoke, Colorado, Canisteo and Toledo. The Dean Richmond and St. Louis will alternately leave here each Wednesday and carry passengers. The Passaic and Canisteo will also carry passengers and alternate in leaving here on Mondays. The "Union Transportation Company," successor to the "Merchants' Western" and the "Jonathan Myers' Canal" lines, ship their freight by this steamboat line in connection with the Erie Canal. The "Union Despatch Company" ship by this line and the Erie Railway. The St. Louis, the first through boat of the line, arrived here last Sunday. It is expected to send out about seven boats per week during the season.

The Western Transportation Company will run a daily line of propellers to Buffalo, connecting there with the New York Central Railroad and the Erie Canal. The line is composed of twelve propellers, all of which offer passage accommodations; the Idaho, Empire State, Potomac, Oneida, Fountain City, Badger State, Plymouth, Mohawk, Vanderbilt, Free State, Chicago and Susquehanna. The Western Express Company ship by this line *via* the New York Central.

On the Chicago, Milwaukee & Lake Superior Line the propellers Cuyahoga and City of Madison will leave each week for Milwaukee and Duluth, stopping at all ports on the south shore of Lake Superior. It requires two weeks to make the round trip, and the first boat will be sent out so as to reach the Sault as soon as the canal is opened, which will probably not be before the 1st of May. It is expected to send a boat from here each Wednesday.

Messrs. Leopold & Austrian have one of their propellers, the Norman, now in Lake Superior. She begins this week making trips between Marquette and Duluth, and will be occupied on this route until the canal is opened. The Ontonagon is here and will start as soon as Lake Superior can be reached, after which the two propellers will form a weekly line between this city and Duluth.

Illinois Central.

The following is the report of receipts for the month of March, 1871:

LAND DEPARTMENT.

Acres construction lands sold	5,465.27 for	$52,349 34
Acres interest fund lands sold	.....	.....
Acres free lands sold	.....	.....
Total sales during month of Mar., 1871	5,465.27 for	$52,349 34
To which add town lot sales		100 00
Total of all	5,465.27 for	$52,449 34
Cash collected in March, 1871		$148,263 53

ESTIMATED EARNINGS—TRAFFIC DEPARTMENT.

	In Illinois, 707 miles.	*In Iowa, 402 miles.*	*Total, 1109 miles.*
Freight	$282,476 00	$53,513 00	$335,989 00
Passengers	139,886 07	44,594 15	184,481 12
Mails	6,375 00	3,059 33	9,434 33
Other Sources	74,000 00	2,940 67	76,940 67
Total, March, 1871	$502,737 07	$104,107 15	$606,845 12
Total actual earnings, Mar., 1870	$498,806 60	102,523 30	$601,326 90
Increase	$3,934 37	$1,583 85	$5,518 22

An increase of ¾ per cent. on the Illinois lines, of 1⅓ per cent. on the Iowa lines, and nearly one per cent. on the entire line.

Chicago & Northwestern.

The ice in Escanaba River and Little Bay de Noquet, which has until this week prevented steamers from reaching Escanaba, went out last Wednesday, and the steamer Saginaw was at once ordered to take her place on the company's Green Bay & Escanaba line, to run daily with the George L. Dunlap, in connection with the Northwestern's trains. One of these steamers will leave Green Bay each morning except Monday, so that hereafter passengers leaving here at five o'clock p. m. will find a much pleasanter route to the Lake Superior country than by the stage route as heretofore this season.

Chicago & Iowa.

The section of this road between Rochelle and Oregon, which has so long been nearly completed, was last week finished as far as the river opposite Oregon, and a daily freight train is now running each way over the entire line to Aurora. The following is a list of the stations, with the distances of each from Aurora:

	Miles.		*Miles.*
Aurora	0	Waterman	25½
West Aurora	1	Cornton	31½
Chicago, Burlington & Quincy Junction	1¼	Steward	40½
		Rochelle	47½
Blunt	13½	Oregon	62½
Hinckley	19½		

Aurora is 38½ miles from Chicago, by the Chicago, Burlington & Quincy road, making the distance from Oregon to Chicago 101 miles. Next Monday or Tuesday a daily passenger train each way will run over the whole road, connecting with the Chicago, Burlington & Quincy trains.

—The earnings of the Toledo, Wabash & Western Railway Company show a continued increase. The following is the latest monthly statement. The earnings for March, 1871, were $393,455; for the same month in 1870, $295,278, showing an increase for the month of $98,177. The earnings from January 1, to April 1, 1871, were $1,087,420.83; for the same months in 1870, $846,587.89, showing an increase of $240,823.84.

RAILROAD GAZETTE

PUBLISHED EVERY SATURDAY.

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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary the inventor is expected to furnish his own engravings or to pay for them.*

Engineering and Mechanics.—Communications and correspondence relating to these subjects should be directed to M. N. Forney, No. 72 Broadway, New York. Subscriptions and advertisements will be received at the New York office, and any other business transacted with those to whom that office is most convenient.

☞ *Our Prospectus and Business Notices will be found on the last page.*

FREIGHT RATES TO AND FROM CHICAGO.

Mr. J. W. Preston, recently chosen President of the Chicago Board of Trade, in his inaugural address the other day said:

"Our position as a commercial center, both for the purchase of goods and merchandise and the sale of the products of the soil, is, perhaps, without a superior, and, with a fair degree of equality in our treatment by the great transportation lines of the country, we may safely feel secure in a continuous and prosperous commercial existence. But, however much nature may have done for us in the past, if our railway lines continue to discriminate against the trade of this city, as they have done, and are doing to-day, it will require vast effort on our part to maintain any such rate of growth and increase as in previous years.

"If a bale of goods, or a barrel of wheat, be carried from the producer to the consumer through this city, at rates greatly below what would be charged were it stopped here, it is plain to see that such discrimination, whatever it may be, is, to its extent, directly antagonistic to our prosperity. We do not ask our Western railroads to discriminate in our favor. We would not wish them to adopt a policy tending to force property or business to us. All we ask is, that they shall give us the same facilities as they give others. And if, under a fair competition, this city cannot retain and increase its trade, then we shall be glad for our interior and Eastern friends that they can do better than to trade with us."

Of all places Chicago should be the last to complain of discriminations in charges. There is no considerable city in the United States which has the benefit of so low rates for so great a distance to and from the Eastern seaboard. The rates both of freights and fares to and from Cincinnati, which is about 145 miles nearer New York, are usually only about one-twelfth lower than Chicago rates; and rates to and from St. Louis, which is but 150 miles further from New York, are about one-fourth higher than Chicago rates; that is, with an advantage of 16⅔ per cent. in distance Cincinnati has an advantage of but 8 per cent. in freight charges, and with a disadvantage of 17 per cent. in distance, St. Louis has a disadvantage of 25 per cent. in charges. It is doubtless quite true that this is a legitimate advantage and not the result of favor to Chicago. The amount of business to and from Chicago makes that traffic more profitable than the Cincinnati and St. Louis traffic even at its higher rates.

But Mr. Preston's remarks probably had reference to shipments to and from small interior cities, which, made by the car load in cars running through without change, are often taken at rates lower than if the shipment were broken at Chicago. Grain can be shipped from Peoria to Lowell direct at a lower rate than the sum of the rates from Peoria to Chicago and from Chicago to Lowell. So long as nearly all grain shipments were made by lake and rates by lake were very much lower than rail rates, Chicago could not fail to be the great receiving depot for the grain of the interior. It gave the best facilities for the transfer from rail to lake, and such a transfer was then indispensable; but rail rates have been decreasing and rail transportation improving, so that now shipments can be made directly from the country station where the grain is raised to the village in the Middle or New England State where it is consumed, eliminating two or three or more handlings which are necessary in the rail-lake-canal route, and grain shipments, *especially shipments for domestic consumption*, are made more and more every year by the all-rail routes. Now in these shipments Chicago serves no useful purpose. One of their chief advantages is that they bring the consumer and producer nearer together and eliminate the commissions and handlings necessary when the grain is transferred from cars to vessels. As improvements in transportation by rail are made and as the rates decrease, we may expect the proportion of rail shipments to increase, until the great bulk of the grain shipped from the West is carried to the East by rail. When once the rail rates become as low as lake rates (apparently a remote and improbable contingency, but by no means impossible), doubtless there will be very few lake shipments, and the grain trade of Chicago may be little larger than that of Indianapolis, Peoria, Decatur or Quincy. This will not be the result of favoring the interior towns, for they will have no more business than heretofore—just the same amount of buying of produce—but of the discontinuance of a business which improvements in transportation will have rendered unnecessary. The saving thus effected will be to the advantage of the producer and the consumer, and will hardly affect dealers in the interior towns, it being quite as easy for a buyer in Mendota to consign a car load of grain to a miller or dealer in Worcester as to a commission merchant in Chicago.

The truth is, that Chicago, Milwaukee, and other lake ports are not *primary* receiving depots of grain, but secondary, and that it will be an advantage to the world, if not to these cities, if this secondary business can be made unnecessary, just as any labor-saving device is advantageous, though perhaps for a certain class of men or a certain place disadvantageous.

It costs no more—considering the cost of station accommodations and service in this city, probably somewhat less—to ship grain from Joliet to any point east, than from Chicago to the same point. If the grain is to go through to its destination by rail, there is no more reason that it should stop and change hands in Chicago than in Fort Wayne or Indianapolis.

There is not the same advantage in shipments of merchandise westward, which have long been made chiefly by rail. The saving in cost is not to be compared with the advantage of a great market near at hand. Our Western merchants will buy goods in Chicago, Cincinnati and St. Louis, even if they cost more when laid down at their doors than if they were bought in New York. They can go to the former cities every few weeks and select new stocks, and the time and cost of travel to New York is more than an equivalent for the saving in the cost of merchandise.

Narrow Gauge in Iowa.

A company called the "Iowa Narrow-Gauge Railroad Company" was recently organized in Marshalltown, Iowa, for the purpose of constructing cheap railroads from that place into the surrounding country, if, after examination, such roads are found desirable and advisable. The officers, we understand, are expected to first visit and study the narrow-gauge roads already in operation in America. The directors are H. E. J. Boardman, F. D. Hager, A. T. Price, E. G. Sleight, W. S. Rice, A. C. Abbott, John Turner, E. C. Rice, W. H. Weatherly, B. F. Frederick, E. Willigrod, Marshalltown; C. B. Rhodes and Geo. Curry, Edenville, D. M. Moninger, Marietta; W. J. Wilbur, Vienna. The officers are John Turner, President; A. T. Price, Vice-President; F. D Hager, Treasurer, and M. H. Haviland, Secretary.

We hope that these gentlemen will not confine their attention to narrow-gauge railroads, but investigate the question of cheap railroads generally. We need a system of light roads for a light traffic as feeders to heavier lines, and it is essential that these be proportioned to the work they have to do, and especially that they be *cheap*. A traffic of two or three thousand dollars per mile per year will not pay interest on any considerable amount of capital. With our wretched common roads it is the more necessary to make artificial routes for transportation so numerous that no considerable cultivated country in a well-settled State may be more than a few miles from one. But our ordinary railroads are far too costly for this. To construct a heavy railroad through a farming country without large towns, where the traffic from only six or eight miles on each side can be obtained, is like furnishing a coach to carry a wren. The vehicle is far too big for the load. In Iowa, wooden railroads are out of the question, for want of cheap wood. That engineer will do the country great service and himself great honor who will design a railroad and rolling stock of the cheapest construction practicable and capable of carrying a light traffic at low speeds.

Organization of the Pennsylvania Company.

On the 6th inst. the "Pennsylvania Company," which operates the line west of Pittsburgh controlled by the Pennsylvania Railroad Company, completed its organization, and the following roster of officers was announced: President, Thomas A. Scott, (First Vice-President Pennsylvania Railroad Company); Vice-President, William Thaw, (long connected with the Union Freight Line); General Manager, J. N. McCullough, (General Manager Pittsburgh, Fort Wayne & Chicago Railway); General Agent, Wm. P. Shinn (formerly General Freight Agent of the Fort Wayne road); Comptroller, Thomas D. Messler (Assistant President Pittsburgh, Fort Wayne & Chicago Railway Company); Auditor, J. P. Farley (Auditor of the Fort Wayne road); Cashier, J. P. Henderson, (Treasurer of the Fort Wayne Company); Chief Engineer, F. Slataper, (Chief Engineer of the Fort Wayne road); Secretary and Treasurer, W. H. Barnes; General Passenger and Ticket Agent, F. R. Myers; Assistant Passenger and Ticket Agent, W. C. Cleland (heretofore General Western Passenger Agent of the Fort Wayne road); General Freight Agent, William Stewart (heretofore Superintendent of the Cleveland & Pittsburgh road); Assistant Freight Agent, C. L. Cole; General Purchasing Agent, William Mullins (Purchasing Agent of the Fort Wayne road); Superintendent of Eastern Division, J. D. Layng, (holding same title on the Fort Wayne); Assistant Superintendent of Eastern Division, Richard Wiggins; Superintendent of Western Division, C. E. Gorham (long holding that position on the Fort Wayne road.)

It is reported that the management of the Pittsburgh, Cincinnati & St. Louis road and its leased lines will be conducted independently, with the following staff: Thos. A. Scott, President; William Thaw, Vice-President; J. N. McCullough, General Manager; J. D. Layng, Assistant General Manager; John Durand, Superintendent Pittsburgh & Cincinnati; D. W. Caldwell, Superintendent Columbus, Chicago & Indiana Central Division; T. D. Messler, Comptroller; J. E. Davidson, Auditor; M. J. Becker, Chief Engineer; Wm. Stewart, General Freight Agent; James Means, Assistant Freight Agent; F. R. Myers, General Ticket Agent; W. L. O'Brien, Assistant Ticket Agent; J. G. Morris, Secretary; C. L. Hallowell, Treasurer; W. Mullins, General Purchasing Agent.

From this it appears that the General Manager, Assistant General Manager, Comptroller, General Freight Agent, General Ticket Agent and General Purchasing Agent of the Pan-Handle are also officers of the Pennsylvania Company. The two division superintendents, the Chief Engineer, the Secretary and Treasurer have held the same positions heretofore; the Assistant Freight Agent has been General Eastern Freight Agent and the Assistant Ticket Agent has been General Ticket Agent of the same road.

The officers of this organization are picked men, and the company ought to be able with such a force to work the lines committed to its charge with the greatest efficiency.

The Indiana Aid Law.

On Wednesday last the Supreme Court of Indiana delivered an opinion in a case appealed from Tippecanoe County, involving, we believe, the validity of a subscription by that county or by the city of Lafayette to the Lafayette, Bloomington & Mississippi Railroad. The court below decided the subscriptions invalid, by reason of the unconstitutionality of the law. The Supreme Court reverses this decision and affirms the validity of the subscription and the constitutionality of the law. This decision has been awaited with great anxiety, as there are many projected roads in Indiana which could not be commenced or completed without the aid voted to them by the towns and counties on their lines.

UNIV. OF MICH.

Engraved for the Railroad Gazette.

JOHN B. TURNER.

THE LATE JOHN B. TURNER.

We give, with this number, a portrait of the late John B. Turner, in connection with which the following biographical sketch of the subject, more extended than what we gave at the time of his death, may prove interesting. We have embodied in it what was said in our previous article regarding the character of the man:

John B. Turner was born in Colchester, Delaware County, New York, on the 14th of January, 1799; but losing both parents in childhood, he was brought up by relatives residing in Dutchess County, and in his early manhood removed to Troy. His first entrance into railroad life, which his later years so amply and worthily illustrated, was in the character of contractor for the building of the railroad from Troy to Ballston Springs. On this primitive line horses furnished the motive power, and the passenger cars were of the coach pattern, with entrance on the sides, and seats for eight persons.

Adopting the business of contracting, Mr. Turner next undertook the construction of a section of the New York & Erie Railroad, on which work had then been resumed under the direction of the State. The financial reverses of 1836–7 occurring soon after, work was again suspended. Captain Turner soon after assumed a heavy contract upon the Genesee Valley Canal, between Dansville and Rochester, which he completed at a large profit to himself and in a manner that assured his reputation for integrity, energy and judgment. He was soon after sought for by his early friends of Troy to undertake the building of the Troy & Schenectady Railroad—distinctively a Trojan enterprise, and one by which it was hoped to flank the hostile neighbor, Albany, and divert the golden stream of Western trade to Troy.

Having finished this work, Captain Turner determined to make a settlement in the West, and selected a location at Blue Island, in this county, where, in 1843, he purchased a large tract of land and engaged in sheep-raising. We may conclude that this pastoral life proved too tame to satisfy his active mind, accustomed to deal with "matters of pith and moment," and to bear the strain of large responsibilities. After two years he removed to Chicago, and made his home on the North Side—still, however, carrying on his farm at Blue Island. Here his high reputation for integrity and administrative ability at once made him a leading character, and he afforded his assistance and advice to many enterprises of local and public interest.

About this time the Galena Railroad project, which, like all public works, had gone under in 1837, was revived, and after many delays the "Galena & Chicago Union Railroad Company" was reorganized April 5, 1847. Capt. Turner was induced by the projectors of the enterprise, who were familiar with his capacity and large experience in railroad matters, to consent to assume the active management of the work, and on August 10th, 1847, books of subscription to the stock were opened, and a Board of Directors chosen. Capt. Turner was chosen Acting Director and Superintendent, and immediately undertook the work. In March, 1848, ten miles of the road had been completed and the first locomotive west of Lake Michigan was put upon the track. This locomotive, aptly named "Pioneer," was one of the first built at the shops of Matthias W. Baldwin (now the Baldwin Locomotive Works) in Philadelphia, and had already seen service on the Albany & Schenectady and Rochester & Canandaigua railroads, in New York. It is still in service as a switch engine upon the Northwestern road, although it may be doubted if after two or three rebuildings anything save the name remains.

The progress of the Galena Railroad would appear slow in these days. November 1, 1849, it was opened to Elgin; August, 1852, to Rockford; September, 1853, to Freeport. Yet the means for these successive extensions were obtained only by the most strenuous personal exertions of Captain Turner and others of the directors, and by the frequent and generous loan of individual credit, while doubters and obstructives were not lacking to show that the building of the road was to be the ruin of Chicago's country trade. In December, 1850, Captain Turner was elected to the presidency of the company, succeeding the Hon. Wm. B. Ogden. In 1853, work was commenced upon the Dixon Air Line, and in December, 1855, it was completed to the Mississippi River at Fulton. During the time of Captain Turner's presidency he was the active manager of construction and operation, devoting himself with fidelity and energy to the interest of the company. He aided in organizing a company in Iowa for a western extension of the Fulton line, and was concerned in other enterprises of a like nature, all, however, designed to serve as feeders to Galena lines. In June, 1859, he resigned the presidency, leaving the road in a highly prosperous condition.

In 1864, upon the consolidation of the Galena with the Chicago & Northwestern Railway, Captain Turner resumed his active connection with the road, and afterwards until his death was a member of the Managing Committee of the latter company. He held numerous other positions of trust and honor, was one of the Board of Commissioners by whom the Chicago Water Works were originally undertaken, and at the time of his death was a member of the Lincoln Park Commission.

His judgment in railroad questions was held of such value that he was frequently selected for important trusts in that connection. He was appointed on the State Board to appraise the Illinois Central Railroad, and during the war undertook, in behalf of the government, the examination and adjustment of railroad rates for government transportation; and it is worthy of note that his figures were adopted without alteration by the Government Commission. Captain Turner devoted himself with such singleness of purpose to the discharge of his railroad trusts that he found no time to engage in private enterprises, and accumulated but little property, thus yielding his own private interests in favor of those he represented for others.

The rule of "*mens sana in corpore sano*" has no more apt illustration than Captain Turner. The vigorous, hearty physique was a true index of the healthful and active mind. Patient under difficulties, ready in emergencies, prudent in counsel, energetic in affairs, deliberate in judgment, firm in action, all his faculties were in equipoise, balancing and strengthening one another.

In public affairs and in his connection with the railroad interests of the Northwest, Captain Turner ranks among the foremost of those men, few in number, whose public spirit, energy and prescient sagacity, laid, a quarter of a century ago, the broad and sure foundation of Chicago's commercial prosperity, and whose small beginnings have already yielded their thousand fold. In recent conversations with Captain Turner, whose memory was unusually retentive and exact, we have especially noted the boldness and forethought which, in those early days, while yet the Galena road was struggling toward Freeport, had already devised for it a system of railroads covering the Northwest and reaching through the wilds of Iowa to touch the almost *terra incognita* of the "Missouri Slope." The original line of the Burlington road was included in the plan and was commenced under Captain Turner's management.

His exact observation and tenacious memory of topographical features were remarkable. He knew every foot of the Galena road, and could describe with the utmost accuracy the general outline, and local peculiarities of every part of the country traversed by it.

In public and private affairs Captain Turner was thoroughly upright, and singularly scrupulous and exact in the performance of all duties and trusts. In manner, he was a true gentleman, gentle, modest, cordial and straightforward. Age was with him not a season of decay and infirmity, but rather of ripening. Though of late years retired from active business, he continued to the last hale and vigorous, enjoying all of life, a keen observer, full of interest in the events of the day, traveling extensively and frequently, and "roughing it" on occasion, in the camp or on the road, with the zest of a boy.

On a visit made to the Pacific coast in 1869, when past 70, he took his part in all the adventures of the journey, including the long and fatiguing trip to the Yo Semite, and various explorations in the Sierra Nevada, and returned fresh and vigorous as any of the party.

Our portrait was drawn by Mr. A. F. Brooks, of this city, from a portrait in oil by Pebbles, which many of our readers must have seen, and was engraved by Bruen, of New York. The expression, though characteristic, is perhaps not that which he most commonly presented, which had more of sweetness and less of firmness. Of the character of the work little need be said. We believe it to be the best specimen of a portrait on wood that has ever been published in Chicago and most creditable to the artists and the printer—the printing of such fine works being of itself a fine art.

NEW PUBLICATIONS.

American Journal of Microscopy.—Nothing but a profound love of scientific truth and investigation will ever effect much for the true *progress* of science; but a great step is taken towards making science popular when it has been made fashionable. This is a strange coupling of words—science and fashion—but they belong together, nevertheless, in Chicago, at least, so far as regards the science of microscopy. It is "the style" to have a microscope, and many business and professional men own costly instruments and are quite expert in their manipulation. Such is the interest in the science, that it has been thought worth the while to establish a monthly journal with the above name, in this city. It is a magazine of 32 octavo pages, edited by the well-known physician and scientific man, Dr. E. M. Hale, and published by George Mead & Co., No. 182 South Clark street. It aims to give not only the latest highest results of microscopic investigations, but also much popular information on the subject, which form what might be called a youth's department in microscopic science.

As a microscope seems likely to become a necessary article in every well-regulated family, so will the *Journal of Microscopy*. Price, $3 a year.

REGISTER OF EARNINGS.

FOR THE MONTH OF MARCH.

Illinois Central (1109 miles), 1871	$606,845 12
" (974 miles), 1870	601,326 90
Increase (1 per cent.)	$5,518 22
Michigan Central (284 miles), 1871	$441,665 86
" " (284 miles), 1870	384,430 68
Increase (15 per cent.)	$57,254 68
Earnings from all sources	$486,990 63
Chicago & Alton (511 miles), 1871	$1,068,322 60
" " (431 miles), 1870	940,042 64
Increase (13⅝ per cent.)	$128,179 96
Toledo, Wabash & Western (682 miles), 1871	$393,477 00
" " " (522 miles), 1870	295,278 00
Increase (33⅓ per cent.)	$98,177 00
Marietta & Cincinnati (251 miles), 1871	$140,749 60
" " (251 miles), 1870	101,879 00
Increase (38⅛ per cent.)	$39,361 00

FOR THE FIRST WEEK IN APRIL.

Chicago & Alton (511 miles), 1871	$98,741 94
" " (431 miles), 1870	78,203 60
Increase (26 per cent.)	$20,538 34

Cost of Superstructure of Railroads of Various Gauges.

In a very interesting circular issued by M. Baird & Co., of the Baldwin Locomotive Works, which gives photographs of various patterns of locomotives suitable for narrow-gauge roads, the following estimates of the cost of the superstructure of five different gauges is given. Each is for a mile of single track:

1st. FOR 4 FEET 8½ IN. GAUGE.—RAIL 55 LBS. PER YARD.

87 Tons of Rails, @ $70.00 per ton	$6,090 00
400 Rail splices, " 1.00	400 00
4,500 Lbs. spikes, " 5	275 00
2,640 Cross ties, " 80	2,112 00
2,000 Cubic yards gravel ballasting, @ 50 cts.	1,000 00
Laying 1 mile of track	500 00
Total	$10,377 00

2d. FOR 3 FEET 6 IN. GAUGE.—RAIL 35 LBS. PER YARD.

55 Tons of rails, @ $75.00 per ton	$4,125 00
340 Rail splices, " 60	204 00
3,520 Lbs. spikes, " 6	211 20
3,520 Cross ties, 5 feet long, 5x6 in., @ 40 cts.	1,408 00
1,200 Cubic yards ballasting gravel, @ 50 cts.	600 00
Laying 1 mile of single track	350 00
Total	$6,898 20

3d. FOR 3 FEET GAUGE.—RAIL 30 LBS. PER YARD.

47½ Tons of rails, @ $75 00 per ton	$3,562 50
330 Rail splices, " 50	165 00
3,520 Lbs. spikes, " 6	211 20
3,520 Cross ties, 5 feet long, 5x6 in., @ 30 cts.	1,056 00
1,000 Cubic yards ballasting, @ 50 cts.	500 00
Laying 1 mile of single track	300 00
Total	$6,794 70

4th. FOR 2 FEET 6 IN. GAUGE.—RAIL 25 LBS. PER YARD.

40 Tons of rails, @ $75.00 per ton	$3,000 00
330 Rail splices, " 50	165 00
3,520 Lbs. spikes, " 6	211 20
3,520 Cross ties, " 25	880 00
1,000 Cubic yards gravel ballasting @ 50 cts.	500 00
Laying 1 mile of single track	250 00
Total	$5,006 20

5th. FOR 2 FEET GAUGE.—RAIL 20 LBS. PER YARD.

31½ Tons of rails, @ $75.00 per ton	$2,362 50
330 Rail splices " 45	148 50
3,520 Lbs. spikes " 6	211 20
3,520 Cross ties " 20	704 00
750 Cubic yards ballasting, @ 50 cts.	375 00
Laying 1 mile of single track	250 00
Total	$4,051 20

COMPARATIVE COST PER MILE OF EACH GAUGE.

Cost of 4 feet 8½ in. track,					$10,377 00	standard road used.	
" 3 " 6 in.	"				6,898 20	reduction 33½	per cent.
" 3 "	"				5,794 70	" 44	"
" 2 " 6 in.	"				5,006 20	" 52½	"
" 2 "					4,051 20	" 60	"

TRAFFIC AND EARNINGS.

—The traffic receipts of the Grand Trunk of Canada for the week ending March 18 amounted to £28,500, against £21,800 in the corresponding week of last year, showing an increase of £6,700, or 30¾ per cent.

—Secretary Shaffer, of the Iowa State Agricultural Society, furnishes the following figures of the exports of Iowa products in 1870, over the several east and west railroads of the State:

Cattle, head	126,253
Hogs, head	524,119
Sheep, head	78,495
Wheat, bushels (not including flour)	15,311,842

The figures of timber carried westward are as follows:

Lumber, feet	343,761,666
Shingles and lath, m	51,510,340

—A telegram from New York says that in the week ending April 9, 835 cars, containing 349,936 bushels of grain, arrived here *via* the Erie Railway. The shipments of westward bound freight, during the same time, averaged 275 cars per day, which is, probably, the heaviest business ever transacted on this road in any one week.

General Railroad News.

OLD AND NEW ROADS.

Allegheny Valley.

The report of the company shows that the gross earnings from all sources for the year ending

January 31, 1870, were	$1,705,033 38
The gross earnings for the year ending January 31, 1871, were	1,204,777 02
Increase of earnings of year 1871 over that of 1870	$500,256 36
The net earnings for 1871 were	831,951 37
The net earnings for 1870 were	510,924 68
Showing increased net earnings of year 1871 over 1870 of	$321,026 69

The expenses of working the road have been 51 2-10 per cent. of the gross earnings, showing a decrease of 6.4 per cent. from last year.

The construction and equipment expenditures are set forth in detail in the General Superintendent's report:

For construction	$244,146 70
For car equipments	253,096 67

The bonded and other indebtedness on the 31st January, 1870, was as follows:

First mortgage	$146,000 00
Second mortgage	39,000 00
General mortgage	3,785,000 00
Bonds paid to the Commonwealth of Pennsylvania in exchange for Sunbury & Erie bonds	3 503,000 00
First mortgage bonds, Bennett Branch	50,000 00
Floating debt	531,113 77
Bond for real estate	21,564 73
	$7,922,678 50

The bonded and other indebtedness on the 31st January, 1871, was as follows:

First mortgage	$112,000 00
Second mortgage	28,000 00
General mortgage	3,823,000 00
Bonds paid to the Commonwealth of Pennsylvania in exchange for Sunbury & Erie bonds	3,500,000 00
First mortgage bonds, Bennett Branch	48,000 00
Floating debt	573,768 90
Bond for real estate	84,564 73
	$8,119,333 63
Decrease of bonded debt	18,000 00
Increase of floating debt	44,090 40

The increase of the floating debt, which is but $44,090.40, has been owing to the demands of the company for new rolling stock.

State Line & Union.

A correspondent sends us the following, with the consent of the officers of the road:

"This road was organized April 7, 1871, under a charter obtained during the last session of the Wisconsin State Legislature. The charter authorized the corporators to form a company and locate a railway from the State line in the town of Bloomfield, Walworth County, along the line of the old Wisconsin Central Railroad, to a point at or near Columbus, Columbia County, Wis. At a meeting of the stockholders at the office of C. M. Baker, in the town of Geneva, the following named gentlemen, stockholders in the road, were elected directors: C. M. Baker (attorney, Geneva); E. D. Richardson (banker, Geneva); J. C. Walter (capitalist, Chicago); R. H. Baker (of J. J. Case & Co., Racine); Jas. Haskins (farmer), C. T. Oatman (farmer), T. C. Smith (merchant), T. Curtis (merchant, Geneva); Gen. J. W. Boyd (farmer, Linn). The directors, at a subsequent meeting, elected C. M. Baker, President; E. D. Richardson, Secretary and Treasurer; C. M. Baker, E. D. Richardson and J. C. Walter, Executive Committee.

"The stockholders purpose to commence the construction of the road as soon as the proper arrangements can be effected."

Toledo, Wabash & Western.

The President and Directors of the company were at Fort Wayne last week, investigating the practicability of removing their shops to some other point, they claiming that their shops must be increased, and that land cannot be purchased in Fort Wayne for that purpose without paying exorbitant prices for it. They came to no decision. The pay-roll amounts to about $30,000 per month.

The Indiana Aid Law.

Judge Tousely, of the Elkhart Circuit Court, has decided the Railroad Tax law passed by the Legislature of 1869 to be constitutional, and directed the collection of taxes in Elkhart County, levied under that act, to aid in the completion of a railroad. It is this law which the Tippecanoe Circuit Court declared unconstitutional in a case now pending in the Indiana Supreme Court.

Grand Tower & Carbondale.

This road has been in operation two or three years, but it is only of late that its list of stations has been published. They are as follows, with distances from Grand Tower, on the Mississippi:

	Miles.		Miles.
Grand Tower	0	Mount Carbon	19
Fountain Bluff	5	Thompson's	24
Sand Ridge	10	Carbondale	27
Mount Pleasant	15	Ill. Cent. Depot	28

It connects with the Illinois Central at Carbondale, 308 miles from Chicago. It is owned by the Grand Tower Mining, Manufacturing and Transportation Company, and is used chiefly for the transportation of coal and iron to and from its mines and furnaces on the line.

Burlington & Southwestern.

This road is now completed to Sugar Creek, 16 miles from Fort Madison, but only about ten miles from the junction with the Burlington & Keokuk Branch of the Chicago, Burlington & Quincy. About eight miles more are to be completed in order to reach Farmington, where the line is to cross the Des Moines River.

Iowa, Minnesota & North Pacific.

Under this name a corporation has been organized in Iowa, which, the articles state, intends to construct a railroad from a point, yet to be determined upon, in the southern or southeastern portion of the State of Iowa, to run through Jasper, Story and Hamilton counties, *via* Newton, Nevada, and Webster City, in a northwesterly direction to the northern boundary of the State. The capital of the company is set at $12,000,000, and the Directors are D. D. Chase, W. C. Wilson, John Mayer, J. R. Meershon, Wm. Vaughan, L. A. Woodruff, George Haish, John Scott, James Hawthorn.

Little Rock & Fort Smith.

The following are the stations and distances on the 49 miles of the road opened last month:

	Miles.		Miles.
Little Rock	0	Conway	30
Bartlett	10	Cadron	38½
Palarm	16½	Plummer's	44
Gold Creek	25	Lewisburg	49

New York & Oswego Midland.

The annual meeting of the commissioners and stockholders was held in Oswego on the 28th ult. The annual report by Mr. Littlejohn gives a very full and satisfactory presentation of the progress of the work, its financial matters, the successful operation of 225 miles of road, and favorable prospects of its early completion to New York, the procuring of dock frontage at Jersey City, rapid progress of the tunnel, completion of shops, depots, etc., procurement of iron, etc.

The Oswego *Palladium* says that under the arrangement with the Delaware & Hudson Canal Company, they have arranged to market over the Midland during the coming year 300,000 tons of coal, and if this is done, the road will pay seven per cent. from Sidney Plains to Oswego.

Louisville, New Albany & Chicago.

In the United States Circuit Court at Indianapolis recently, Judge Drummond denied the motion of the bondholders of this company to dissolve the Receivership. Judge Chapman remains in undisputed possession of the same, and, it is said, is getting the road in good condition.

Indianapolis, Cincinnati & Lafayette.

The receivers of this railroad were granted authority on the 6th inst. to buy 100 freight cars, and to purchase the iron and other things necessary to put the track in good order, the total amount of the expenditure to be not more than $240,000, which is to be borrowed, and the sum made a lien on the earnings of the road.

Brunswick & Albany.

This railroad is now open from Brunswick westward to Willicoochie, 100 miles. The stations and distances from Brunswick are:

	Miles.		Miles.
Brunswick	0	Junction	70
Hazlehurst	15	Waresboro	76
Waynesburg	80	Peach Creek	87
Satilla	40	Pearson's	95
Sclatterville	55	Willicoochie	100

Connecticut Valley.

This road extends from Hartford southward to Middletown, and thence southeastward to the mouth of the Connecticut at Saybrook, running along the west bank of that river. Its total length is 44 miles. The whole line is graded, and ties and iron are distributed sufficient to lay the road, a locomotive equipment of 30-ton engines has been ordered of the Rogers Works, at Paterson, N. J., and cars of the Watson Company, at Springfield, Mass. It is expected that the entire line will be opened for business next June. This road has been paid for out of the stock subscriptions, and has no bonded debt.

Mississippi & Missouri Valley.

The opening of this railroad from West Quincy up the west bank of the Mississippi to Canton, fifteen miles, was celebrated at Canton this week.

Quincy, Missouri & Pacific.

Since the act enabling Quincy to vote half a million in aid of this line has passed over the Governor's veto, work has been resumed energetically, and it is expected that the line will be completed to Edina, fifty miles, by the 1st of November.

Houston & Texas Central.

This important Texas railroad has recently opened some new stations, as we learn from a new time-table dated April 2. The main line now extends 170 miles northward of Houston, and 17 miles beyond Korse, which has been the terminal station for some months. The new stations on this line are Thornton, 160 miles, and Groesbeck, 170 miles, north of Houston. The Western Branch extends 50 miles west by north from Hempstead, which is itself 50 miles northwest of Houston. Until last fall the terminal station on this branch was Brenham, 25 miles from Houston. In the fall, Burton, 18 miles beyond, was opened, and now trains are running to Ledbetter, 50 miles from Houston.

Madison & Freeport.

The Madison (Wis.) *Journal* of the 4th says: "We yesterday referred to the prospect of the early completion of a railroad from this place south to Freeport. The people on the line of the road are more thoroughly alive to the subject than we had supposed. On Tuesday last a vote was taken in the towns of Exeter, Albany, and Decatur, in Green County, on the question of extending aid toward the building of this road, to the amount of $30,000 for each town; and all the towns gave majorities in favor of extending the aid desired. The old Sugar Valley road extended from the State line to Portage. Thirty-seven miles of the road between Madison and Portage is built and in good running order. Eight miles between Albany and Broadhead is graded. The whole road will be completed within the next year, with a proper effort on the part of the people; and it would seem the effort is to be made. The Hon. James Campbell and the Hon R. B. Sanderson are now investigating the matter, with a view to building the road."

Pittsburgh & Connellsville.

A telegram from Pittsburgh, dated the 10th, announces as follows the completion of this important line, which is likely, in time, to be a section in a through line from Baltimore to Chicago:

"The Pittsburgh & Connellsville Railroad was finally completed to-day, giving Pittsburgh a direct connection with Baltimore. This company has for years been struggling under many disadvantages, pecuniary and legal. Five years ago rival interests were brought to bear against the company, which seemed almost friendless, and an act was passed by the Pennsylvania Legislature forfeiting its charter for the 'abuse and misuse of its corporate franchise.' The passage of this act was a crisis in the history of the road, the forfeiture of the charter being considered oppressive, and stirred up the friends of the road to increased energy. After a long struggle the nullifying act was repealed, the company restored its franchises, and the city of Baltimore and the Baltimore & Ohio road then took an active interest in its behalf, subscribing largely to its stock, and through the active co-operation of President Garrett, of the Baltimore & Ohio road, its early completion was assured. Since that time President W. O. Hughart has pushed the road with extraordinary vigor, and to-day, together with B. H. Latrobe, Chief Engineer and former President, performed the duty of spiking the last rail at a point near Mineral Point. Immediately upon completion the first train proceeded to Cumberland, passing over a temporary road which has been constructed over Brook Tunnel, which has not yet been completed. The total length of the road from Pittsburgh to Baltimore is 325 miles. The highest grade is fifty feet to the mile. Express trains, when running regularly, are expected to make the distance from Pittsburgh to Washington in ten hours, *via* the Point of Rocks route. When completed, the road will cost $9,000,000. Through passenger trains commence running next Monday."

Cape Girardeau & State Line.

The Cape Girardeau *Argus* is informed that this company, which has 25 miles of line extending southwest from Cape Girardeau graded, has made an arrangement with ex-Governor Thomas C. Fletcher, of St. Louis, as the representative of New York capitalists, by which a road will be constructed from some point on the line of the Cairo & Vincennes road near Harrisburg, Ill., southwest about 75 miles to Cape Girardeau, and there connect with the Cape Girardeau & State Line road, which is eventually to be turned over to the association which Governor Fletcher represents. First, this association is to provide means for ironing and equipping the 25 miles of that road now graded, which is to be done by the 1st of December next. A connection with the Cairo & Fulton road near the Arkansas line is contemplated, and thus a short connection between the East and the Texas Pacific.

Hempfield Railroad.

The Hempfield Railroad, running from Wheeling, West Virginia, to Washington, Pennsylvania, 32 miles, including the equipments, was sold on the 30th ult., under authority of the Supreme Court of Pennsylvania, and purchased by John King, Vice President of the Baltimore & Ohio Railroad Company, for $131,000. The Wheeling *Register* says:

"Though not unexpected, our citizens will be glad to receive this news. It gives promise of renewed life

and vigor to the Hempfield and additional trade to the city. This will make a link in the new through line from East to West *via* the Pittsburgh & Connellsville Railroad. Now let our citizens offer liberal inducements to the Baltimore & Ohio Railroad for them to establish their shops here, and the transfer of the Hempfield to the Baltimore & Ohio road will be one of the greatest things that ever happened to Wheeling."

It is understood that the road will be extended to a connection with the Pittsburgh & Connellsville road.

New York & Boston.

A company has been organized in New York to construct a railroad from the Harlem River at Kingsbridge, 13 miles north of the City Hall, New York, northward about halfway between the Hudson River and the Harlem roads to a connection with the Boston, Hartford & Erie road, 58 miles from New York. For half the distance it will be not more than two or three miles from the Hudson River road on one side and Harlem on the other. It looks to a suburban traffic from the beautiful country through which it is to run for its profits, and its managers (now trying to negotiate the bonds of the company), estimate that the receipts from a part only of the 25 stations planned will be $1,092,500, or $18,836 per mile, and the operating expenses 55 per cent. The Harlem Railroad in 1869 earned from through and local business about $20,900 per mile, and its operating expenses 65 per cent. The Hudson River road the same year with its enormous through business earned $43,700 per mile with 52 per cent. operating expenses.

California Pacific.

The Marysville *Appeal* gives the following statements, as authorized by the company:

"Its system of roads is as follows: From Vallejo to Sacramento, with a branch from Davisville to Marysville; branch road from Adelante, 7 miles north of Vallejo, to Calistoga; and road from Stockton to Copperopolis, of which 28 miles will be completed this month, and the balance, making 40 miles in all, this summer. Then there is the Sonoma County road, to branch from the Napa road, and run thence to Cloverdale, which is expected to be completed this year; and the subject of building a branch road from either Marysville or Woodland to Colusa, is under discussion. It is also proposed to change the gauge of the Oroville road so that the cars of the California Pacific can run upon it, and make through trips between Davisville and Oroville. The boats will continue to run to Colusa, Chico and Red Bluff, but it is in contemplation to make Knight's Landing a point of transmission by rail of the grain freights from the up-river country to Vallejo, provided it can be handled more expeditiously and at less cost than at Sacramento. The company proposes to manage its resources so as to compete with the Central Pacific at every point, either by rail or boat. Among the oppositions proposed is that of an Oakland ferry, by the Creek route, for which the Oakland people have been for a long time praying, with but spasmodic and semi-occasional answers to their prayers. The Alviso route—San Francisco to Alviso by boat, thence to San Jose by rail—has not been decided upon as yet. Night boats will be run between Sacramento and San Francisco. The New World will be withdrawn from the Vallejo route, and the magnificent steamer Capital will be substituted in her stead. Of course, to carry out the system of construction and management we have outlined, extensive machine shops and other manufactories will be necessary, and these will be constructed at Vallejo as rapidly as the increase of business may require."

Cincinnati, Richmond & Fort Wayne.

The directors have ordered the resumption of work on the nine miles between Winchester and Ridgeville. About twenty-five miles of the road from Richmond, Indiana, north to Winchester, are already completed, and it is expected to reach Fort Wayne by January next—depending somewhat on the decision pending in the Supreme Court in regard to some township taxes voted.

North Missouri.

The annual meeting was held on the 4th of April. The detailed reports have not yet been presented. The following statistics have been published in the St. Louis *Republican*: The gross receipts for the year ending February 28, 1871, are:

Passenger traffic	$ 985,460 64
Freight	1,507,573 98
Express commissions	62,605 68
Transportation U. S. Mail	47,875 06
Miscellaneous sources	12,285 10
Total	$2,615,800 46
Total for the previous year	2,084,486 05
Increase 25¼ per cent	$531,314 41

The statistics of the passenger department show that of the above amount received for fares, almost 71 per cent. was for local travel.

The amount of grain received at St. Louis during the past year over the road was as follows: Wheat, 866,024 bu.; corn, 704,981 bu.; oats, 591,526 bu.; rye, 42,260 bu.; barley, 57,379 bu. Of the above, the following was received from local stations on the road: Wheat, 546,210 bu.; corn, 126,660 bu.; oats, 432,849 bu.; rye, 23,679 bu.; barley, 22,380 bu. The amount of stock received during the year at St. Louis over the road was as follows: Cattle, 50,095 head; sheep, 35,936 head; hogs, 123,137 head; horses and mules, 2,469, head. The increase from the amount received in freight over the year previous is $394,364.15.

The St. Charles Bridge will be completed about the 1st of June, as the company is assured by the Chief Engineer, C Shaler Smith.

Winterset & Des Moines.

The Chicago, Rock Island & Pacific Company have agreed to iron and operate this road, which it is progosed to build from Des Moines 27 miles southwest to Winterset, if township aid could be secured to grade and tie it. Of the $130,000 needed for this purpose, $105,000 have already been secured and the city of Des Moines is now considering whether they will make up the balance.

New York & Oswego Midland.

The annual report of the company gives the following statements of the progress of construction and the present condition of the work:

	Miles.
Of the Main Line from Oswego to Middletown	223.11
There is finished and in operation	154
Nearly graded, and iron partially laid, and to be operated not later than July, from Sidney to Walton	21
One-third graded from Thompson's to Westfield Flats	27
Not under contract	30
Total	232
Of the branches	121
The New Berlin Branch and Ellenville are now in opration	29½
On the Auburn Branch the iron is laid to DeRuyter	29
The Delhi Branch, and from DeRuyter to Truxton, on the Auburn Branch, will be ready for the iron early in the summer	23½
Not under contract, Truxton to Auburn	30
Total	121

The equipment of the road is as follows:

Locomotives	22
Passenger coaches	17
Baggage cars	7
Baggage and smoking cars	5
Flat cars	193
Box cars	175
Stock cars	10
Coal cars	196

It is expected that the road will be opened from Oswego to the State line by the middle of August next.

New York Central.

A bill is now before the New York Legislature limiting the charge for way and through passengers to one cent and six mills per mile; for sleeping berths or seats in a palace or drawing-room car, $1.50 from New York to Buffalo, or ½ cent per mile for less distances. The rates for freight are fixed for first-class not to exceed two cents per ton per mile; second class, one cent; third class, one cent; fourth class, ¾ cent. Providing, that when freight of the kind and description named is transported for distances less than 50 miles, additional rates may be charged not exceeding 10 per cent. on the above rate. The company is also prohibited from declaring dividends exceeding 10 per cent. on the actual cost of the road and property.

Hannibal & St. Joseph.

Mr. Edward Wilder, Land Commissioner, reports sales of railroad land in North Missouri, for the month of March, to 41 purchasers 2,106.44 acres, and two town lots, for $21,622 92, or an average of $10.26 per acre.

Memphis & St. Louis.

The Western Construction Company has been organized to build this road—the Levee road—from Helena, 145 miles in Arkansas and 95 miles in Missouri, to a connection with the Iron Mountain road for St. Louis. D. S. Ives, Springfield, Ill.; W. S. Lincoln, Ohio; E. Jameson, Peoria, Ill.; Charles W. Manners, Taylorville, Ill.; Charles W. Moore, St. Louis, and others are connected with the construction company.

Troy & Greenfield.

Mr. E. S. Philbrick, engineer, has sent a communication to the Governor of Massachusetts relative to the construction of that portion of the road from North Adams to the tunnel, in which he says, "that as the contracts on the tunnel require its completion in three years, two years will be necessary for the construction of this portion of the road, and it should be done some time before it is to be used. There is a large amount of rock-cutting to be done, and time will be necessary for the settling of the embankments. Land damages have not yet been settled, nothing further having been done than in filing the location. In the advance of real estate and the laying out of lots which may be on the line of the land to be taken, it is recommended that measures be adopted at once to secure the land before it shall advance further in value, and that contracts be advertised for, so that the work may be commenced the present spring. The estimated cost is $125,000; yet with half that amount the work may proceed economically."

New York & Harlem.

The stockholders have voted to increase the capital stock by $2,000,000, and the stock has declined in consequence of the prospect of this watering.

St. Paul & Sioux City.

Work on the extension beyond St. James commenced on Monday. The line has been re-located on a more direct route to Sioux City, and five miles are contracted to be constructed at once.

Kansas City & Memphis.

The Green County Court, in which Springfield, Mo., is situated, has rescinded the orders subscribing $400,000 to the company. It is announced that the contractors, Messrs. Reilly & Co., will proceed with their contract, and, when the first five miles are completed, sue in the Supreme Court for the county bonds. The cause assigned for the rescinding is the alleged illegality of the Kansas City & Memphis Company.

Marietta & Pittsburgh.

An officer of the company writes us:

"We opened up fourteen miles of our line for the transportation of passengers and freight on March 23d, and thus far are well satisfied with the opening business. Our tracklaying is progressing rapidly, and business increasing the farther we extend the line."

This road is to run from Marietta, on the Ohio River, northward, through Caldwell and Cambridge, to Dennison, on the Pan Handle line.

Chicago, Kansas & New Mexico.

A Kansas company with this name has been incorporated to build a road from the Central Branch of the Union Pacific, in Marshall County, southwest through Clay Center, crossing the Kansas Pacific at Salina, and continuing in nearly the same direction across the State, meeting the Kansas and Colorado line in Ford County.

St. Louis & Southeastern.

A telegram from Springfield, Ill., says that articles of consolidation, by and between the St. Louis & Southeastern Railroad Company and the Evansville & Southern Illinois Railroad Company, under the name and style of the St. Louis & Southeastern Railroad Company, and the articles of consolidation of the above consolidated company with the Evansville, Carmi & Paducah County Railroad, under the name and style of the St. Louis & Southeastern Railroad Company, with a capital stock of $10,500,000, were filed in the office of the Secretary of State on the 11th inst. Thus the company has in its control lines from Louisville, from Evansville, and from Shawneetown to St, Louis.

Peninsular Railroad.

The Cassopolis *Democrat* says that funds have been received sufficient to pay off all indebtedness of the Peninsular Railroad incurred for materials and labor since last September, and that the claims are being paid as fast as presented. The gaps between that point and Lansing are all being closed as rapidly as possible, and trains will be running the entire distance between those two places about the last of this month. The Lansing *Republican* has authoratative information that trains will be running from that place to South Bend by the first of June. The road has been in operation for some time from Lansing southwest to Climax, 10 miles southwest of Battle Creek, a distance of 55 miles. From the present terminus at Climax to Cassopolis is about 40 miles, and to South Bend 62 miles, through a country already pretty well cut up by railroads.

Androscoggin Valley.

The route of this road has been fixed from Auburn, on the Maine Central road 33½ miles north of Portland, due north along the Adroscoggin River about 25 miles to Livermore, still close by the river 18 miles to Rumford Falls. The line will pass from Auburn successively through Perryville, East and North Auburn to a point near Turner's Village, thence to Britton's Mills, Livermore, Canton, Peru, Dixfield and Rumford Falls. A committee has been appointed to confer with the Maine Central and Androscoggin roads, in reference to a lease to one or the other.

Boston & Lowell.

A new passenger station will be built this season by this company on Causeway street, Boston, two hundred feet in width and eight hundred feet in length, and at a probable expense of three-quarters of a million of dollars. Near this station the lighter miscellaneous freight business will continue to be accommodated as heretofore, while the more bulky freight, such as ice, coal, lumber, grain to be stored in elevators for home distribution or foreign shipment, will be carried to the quays, where the largest sea-going steamships in large numbers can have plenty of dock room, and sufficient depth of water to lie safely afloat at low tide.—*Pathfinder Guide.*

Mileage of Iowa Railroads.

The recent circular issued by State Treasurer Rankin, of Iowa, says that, according to returns dated the 31st of December last, there were at that time in operation in that State, 2,683 miles of railway. Six hundred and ninety-two miles of track were laid in 1870. The length of the twenty roads in the State is thus given:

	Miles.
Burlington & Missouri	349.60
Cedar Rapids & Missouri River	274.24
Chicago, Iowa & Nebraska	81.81
Dubuque & Southwestern	54.76
Dubuque & Sioux City	142.88
Chicago, Rock Island & Pacific	309.85
Des Moines Valley	248.49
Keokuk & St. Paul	42 03
Milwaukee & St. Paul	250.00
Cedar Falls & Minnesota	75.57
Sioux City & Pacific	80 00
Council Bluffs & St. Joseph	54.88
Burlington, Cedar Rapids & Minnesota	144 00
St. Louis & Cedar Rapids	41 87
Central Railroad of Iowa	151.00
Iowa Falls & Sioux City	13.69
Chicago & Sioux City	45.84
Davenport & St. Paul	43.00
Sabula, Ackley & Dakota	20.05
Iowa Midland Railway	30.00
Total number of miles completed	2,683.00

Washington & Sigourney.

The Washington (Iowa) *Gazette* says that the Chicago, Rock Island & Pacific Company will commence the construction of this new branch from Washington westward in about a month. It will begin on the Chicago & Southwestern a little southwest of Washington, extend thence southwest about three miles, and thence nearly due west. The distance to Sigourney is 27 miles, but the road will probably be continued to Oskaloosa, 23 miles further.

Rockford Central.

The Rockford papers are discussing this proposed new north and south road with a great deal of interest, and seem generally very favorable to it, and to prefer it to a branch of the Chicago & Iowa road from Rochelle or Sycamore. It is now proposed to construct the road from Rockton, on the Western Union Railroad 14 miles north of Rockford, and thus secure a connection with Milwaukee and the lines of the Milwaukee & St. Paul Company, which, it is said, is anxious to obtain such a connection and willing to lease and operate the road with its own equipment until it is supplied with rolling stock. The Rockford Central asks a supscription to the stock of the company in lieu of a subsidy from Rockford.

Chicago & Iowa.

On April 1st the rails were laid as far as Rock River, at Oregon, near which town the terminus of the road has been for the last six months. The appearance of the locomotive was the occasion of the most energetic displays of rejoicing which the quiet little village was capable of.

Maine Central.

A night train with Pullman sleeping-cars between Boston and Bangor is to run by way of this road and the Eastern, of Massachusetts.

Fairbury, Pontiac & Streator.

This railroad, which was graded late last fall, is to be completed as fast as possible. It is intended to extend it southward from Fairbury so as to form a continuous line to the Ohio River at Shawneetown.

New Orleans, Jackson & Great Northern.

A telegram from Jackson, Mississippi, dated the 7th says:

"The bill to amend the charter of the New Orleans, Jackson & Great Northern Railroad passed through the Senate without discussion. In the House everything else was set aside for this bill, which was made the special order for to-morrow. This is the largest and most magnificent scene of grabbing yet presented to the Legislature. McComb is here aiding its passage. The scheme promises to build the road from Canton, its present terminus, to Kosciusko, forty miles, in two years, and to Aberdeen, in five years, on condition that individuals and corporations on the line shall subscribe $7,000 per mile, and that the State shall cede to him (McComb) all its interest in railroads in Mississippi, the present value of which is estimated at $2,000,000, and arises from the proceeds of an internal improvement grant of the General Government."

ELECTIONS AND APPOINTMENTS.

—The election of directors of the New York & Oswego Midland Railroad Company on the 28th ult, resulted in the choice of the following gentlemen: Dewitt C. Littlejohn, Cheney Ames, Oswego; William Foster, Constantia; Dewitt C. Stephens, Oneida; J. Warren Merchant, De Ruyter; E. T. Hayes, Norwich; John R. Clark, Oxford; Henry E. Bartlett, Walton, Delaware County; A. C. Edgerton, Delhi; Edward Phalen, Fallsburg; Henry R. Low, Elisha P. Wheeler, Middletown. The amount of stock represented and voted on was $5,123,400. Of the board elected, William Foster, John R. Clark and Henry R. Law are new members, succeeding William Fowler, of Finland, John A. Randall, of Norwich, and Waldo Hutchins, of New York.

—A. C. Armstrong has been appointed Purchasing Agent of the Lake Shore & Michigan Southern Railway in place of A. Congdon, resigned.

—It is reported that in case the Railroad and Warehouse bill is passed by the Illinois Legislature, Governor Palmer will be likely to appoint as Commissioners Hon. Gustavus A. Koerner, of Belleville, formerly Lieutenant-Governor and late a candidate for United States Senator, and an active politician of excellent character and ability; R. P. Morgan, Jr., of Bloomington, late Chief Engineer of the Lafayette, Bloomington & Mississippi Railway, and an engineer of much experience and unusual talent, and some produce merchant of Chicago, to represent especially the warehouse business.

—The following directors of the Lake Ontario Shore Railroad Company—to build a line from Oswego to the Niagara River at Lewiston—were elected last week: F. T. Carrington, Gilbert Mollison, Luther Wright, J. G. Kellogg, A. S. Page, Oswego; George I. Post, Fair Haven; Wm, O. Wood, Red Creek; James Brackett, David F. Worcester, Rochester; Burt Van Horn, Niagara County; Reuben F. Wilson, Wilson; Joseph L. Fowler, Porter; Orlando P. Scoville, Lewiston. The Hon. Gerrit Smith announced his desire to be excused from acting as President for another year. At the directors' meeting the following officers were elected: President, Gilbert Mollison, Oswego; Vice-President, O. P. Scoville, Lewiston; Treasurer, Luther Wright, Oswego; Secretary, Henry L. Davis, Oswego.

—Hon. E. H. Rollins has been chosen Treasurer of the Union Pacific Railroad Company in place of J. M. S. Williams, resigned.

—Mr. W. B. Williams has been appointed General Agent of the Indianapolis, Bloomington & Western Railway in place of Mr. S. W. Corwin. His headquarters will be at Peoria.

—It is reported that C. W. Mead, late Assistant General Superintendent of the Hannibal & St. Joseph Railroad, has been offered and will accept the general superintendency of the Kansas Pacific.

—On the 5th of April the following directors of the Cincinnati, Richmond & Fort Wayne Railroad Company were elected: Wm. Parry, J. H. Moorman, J. M. Gaar, Elwood Patterson, A. F. Scott, Richmond; Asahel Stone, Winchester; Arthur McKer, Ridgeville; David Crabbs, Daniel Studabaker, Decatur; Maurice Cady, Pliny Hoagland, Fort Wayne. The officers elected are as follows: President, Wm. Parry; Vice-President, Asahel Stone: Secretary, C. C. Binkley; Treasurer, J. H. Moorman.

—The stockholders of the North Missouri Railroad Company at their annual meeting on the 4th of April elected six directors: Gerard B. Allen, Amos Cotting, John R. Lionberger, James B. Eads, William Taussig, Julius S. Walsh. These are all re-elections except Mr. Taussig and Mr. Walsh. One-half of the board is elected every two years. The following directors hold office for two years longer: Barton Bates, John Jackson, James H. Britton, Wm. M. McPherson, Louis B. Parsons, James S. Rollins and John G. Copelin.

MECHANICS AND ENGINEERING.

Baltimore Bridge Company.

This company have the following work in progress: For the Missouri Pacific Railroad, 22 spans, varying from 150 to 98 feet in length; for the North Missouri Railroad, one viaduct of 400 feet and one bridge of 125 feet span; for the Elizabethtown & Paducah Railroad, two viaducts; for the Pittsburgh & Connellsville Railroad, 13 spans, varying from 13 to 125 feet; for the Midland Railroad, of New York, one viaduct, 1,400 feet long; for the United States Government they are building the Mississippi River Rock Island Bridge, consisting of a draw 366 feet long and adjoining spans of 258 and 150 feet. This is the heaviest bridge in this country, and contains the heaviest draw-bridge in the world. For the Arequipa & Peru Railway, of Peru, they are building the Arequipa viaduct, 1,500 feet long and 50 feet high, and for the Lima & Oregon Railway the Aquade-Verrugas viaduct, consisting of four spans of Fink suspension truss of 100 to 125 feet spans, resting on three wrought iron piers, one of 150 feet, one of 250 feet, and one of 179 feet in height.

These bridges are all of iron, and built from plans patented by this company.

Estimated Cost of Narrow-Gauge Roads in Massachusetts.

The Railroad Committee of the Massachusetts Legislature has prepared a report on narrow-gauge roads. The chairman of this committee is Mr. George A. Parker, an eminent engineer. Below is the committee's estimate of the cost of a narrow road:

Let us estimate the cost of building and equipping one mile of a cheap railway, 25 miles long, of 2 feet 9 in. gauge, where the average depth of cuttings and embankments may be reckoned at four feet. The sectional dimensions, and the bridging, masonry and sidings being deduced and averaged from a surveyed line, and the equipment conformed as nearly as practicable to the recommendation of the India committee, and of practical builders in this country, the prices being actually guaranteed by the latter, viz:

Rails		$4,243 00
Sleepers		352 00
Spikes		175 00
Joint fastenings		400 00
Laying track		250 00
Embankment, 6,062 cubic yards		1,513 00
Cuttings, 5,619 cubic yards		1,480 00
Rock cutting, 1,611 cubic yards		1,611 00
Ballast		1,000 00
Sidings		200 00
Masonry and bridges		1,140 00
Rolling stock for whole road, say:		
Engines, 3	$18,000 00	
Passenger cars, 5	5,500 00	
Mail and baggage cars, 2	1,200 00	
Merchandise cars, 35	6,125 00	
Merchandise cars, 25	4,000 00	
	$34,825 00	+25—1,393 00
		$13,757 00

"And the estimate of cost of same road with similar grades and alignment, with a gauge of four feet eight and one-half inches, with the usual provision for rolling stock, viz:

Rail		$6,600 00
Sleepers		924 00
Spikes		264 00
Joint fastenings		700 00
Laying track		325 00
Embankment, 8,6 4 cubic yards		2,151 00
Cutting, 11,708 cubic yards		1,927 00
Rock cutting, 2,085 cubic yards		2,085 00
Ballast		2,000 00
Sidings		334 00
Masonry and bridges		2,000 00
Rolling stock for the whole road, say:		
Engines, 3	$48.00 00	
Passenger cars, 5	20,000 00	
Mail and baggage cars, 2	2,600 00	
Merchandise cars, 30	30,000 00	
Merchandise cars, 20	16,000 00	
	116,600 00	+ 25—4,664 00
		$23,974 00

"The difference is that of nearly one to two, and shows that where cheap roads are practicable, the use of the narrow-gauge may reduce the cost about one-half, without reducing necessary efficiency."

Baltimore & Potomac Railroad Tunnels.

The construction of the tunnel at Baltimore, connecting the Baltimore & Potomac Railroad with the Northern Central Railway, has been let to Thomas Ritter, of Philadelphia. This tunnel is the one that passes under the western part of the city, and is part of the main line to Washington. The tunnel on the Union Railroad will be let to-day. This latter is the tunnel at Greenmount Cemetery, to connect with Canton, in the eastern part of the city, at tide water.

The western tunnel, the contract for building which was secured by Mr. Ritter, runs 7,400 feet under the city. This work will cost from one million to one and a quarter millions dollars when completed. The Union Railroad Tunnel extends some 3,400 feet under ground, with surface track also from the Belvidere Bridge to Canton at tide-water. This will cost $800,000 to $1,000,000. The road, not over three miles in length, is to be used by five other roads, viz: The Northern Central, Baltimore & Potomac, Philadelphia, Wilmington & Baltimore, Western Maryland, and Baltimore & Ohio, to all of which it affords a transit through Baltimore, and connection with the several works named. This cannot fail of being a very profitable enterprise. It is owned and paid for by the Canton Company, to whose wharves it extends. Certain privileges and restrictions exist in the charter, which secure its full use to all roads connecting therewith by paying the stipulated tolls. The work on both these tunnels will be commenced in a few days after both contracts are finally awarded, and vigorously carried forward to completion. The result must prove vastly advantageous to all, and especially to the Canton Company. Quite a number of Philadelphia and Pennsylvania contractors were in the city last week bidding for these railroad tunnel contracts, and they underbid the Marylanders, thereby procuring the work, amounting altogether to over $2,000,000.—*Baltimore Sun, April* 4.

Buffalo Bridge.

The Grand Trunk Railway Company advertised last month in London £205,000 in 6 per cent. mortgage bonds and £66,000 in six per cent. preference stock for the construction of the "International Bridge" over the Niagara River between Buffalo and Fort Erie. The bonds were offered at 93½ and the stock at 91½.

—A circular issued by State Treasurer Rankin says that the gross earnings of the railroads in Iowa in 1870 amounted to $11,932,352.94. Of this sum the Rock Island road earned $2,227,337.17. The tax on the gross earnings was $186,409.74, of which amount $149,127.79 was apportioned among the counties, and $37,281.95 held by the State. The average rate of tax per mile of road was $69.47.

Buffalo Steamboat Lines in 1871.

The Buffalo steamboat lines have just completed their arrangements for the navigation season about to commence, and we hasten to lay them before our readers. It will be seen by reference to the different lines that several new vessels, of the first class, have been added to the fleet, and that several other steamers, strangers at this port, have also been called into our service. The fleet composing the lines given below, is, without doubt, the largest steam fleet running regularly to and from any fresh water port in the world. A better idea of the magnitude of these lines may be obtained from a comparison with the ocean lines running out of New York.

The Union Steamboat line is composed of 28 vessels, the Evans line of 13 vessels, and the Western Transportation Company's line 10 vessels; while Inman's ocean line has 13 vessels, the Anchor line 28 vessels, the National line 10 vessels, Williams & Guion's line 8 vessels, the French line 4 vessels and the Hamburgh & American line 7 vessels. It will be seen that the Anchor line is the only one of the above number that is numerically as strong as the Union line of this city. To be sure our vessels do not ton as much as the ocean steamers, but the aggregate tonnage of our fleet is nearly 53,000 tons, which makes a large average for fresh water vessels. We are gratified to learn, as we do from the agents, that the lake passenger traffic is steadily increasing. To accommodate and encourage this growing business, the passenger steamers of the several lines have been fitted up this spring with unusual care and taste. A more enjoyable trip can hardly be conceived than a circuit of the lakes on one of these magnificent steamers.

Below we give the lines in full:

THE UNION STEAMBOAT COMPANY.

This extensive organization will run during the season of 1871 twenty-eight steamers, in the several lines designated below:

BUFFALO & LAKE SUPERIOR LINE.

Name of Vessel.	*No. Tons.*	*Captain.*
Arctic	787	J. E. Turner.
Pacific	766	Ed. Kelly.
Atlantic	656	F. S. Miller.
Keweenaw	1,200	Albert Stewart.
Meteor	1,100	——
Total, 5 vessels.	4,509	

BUFFALO, MILWAUKEE & CHICAGO LINE.

Jay Gould	996	W. H. Smith.
James Fisk, Jr	1,095	J. W. Moore.
Wm. M. Tweed	1,200	John Kirby.
B. W. Blanchard	1,143	F. A. Brown.
Dean Richmond	1,416	James Pratt.
Colorado	1,470	J. W. Brett.
St. Louis	988	H. A. Sisson.
Passaic	844	F. L. Pope.
Nebraska	1,483	N. Gebhard.
Canisteo	856	J. P. Evers.
Roanoke	1,069	N. Woodworth.
Toledo	792	Sam. Shannon.
Total, 12 vessels.	13,349	

The Jay Gould, James Fisk, Wm. M. Tweed and B. W. Blanchard, of this line, are new vessels.

BUFFALO, CLEVELAND & TOLEDO LINE.

Name of Vessel.	*No. Tons.*	*Captain.*
New York	833	Wm. Cummings.
Eclipse	887	S. Townsend.
Equinox	870	Geo. Bowie.
Araxes	715	John Egeler.
Orontes	711	J. G. Hinde.
Evergreen City	797	O. F. Dicker.
Total, 6 vessels.	4,813	

BUFFALO & DETROIT LINE.

Tioga	995	Wm. Thorn.
Elmira	781	W. D. Douglass.
Wenona	741	O. B. Joiner.
Olean	706	W. Robinson.
Missouri	664	L. Stillwell.
Total, 5 vessels.	3,687	

The steamers of the Lake Superior line will leave Buffalo semi-weekly, and those of the other lines will make daily departures. The docks of the company will be the same as last year, viz.: At the Erie Railway freight depot, foot of Main street, foot of Lloyd street, and the Marine Dock, foot of Mississippi street.

The Wm. M. Tweed is the new steamer now in process of construction at the yards of the Union Dry Dock Co., and is pronounced to be the best freight boat ever built of wood upon the lakes. All the boats of the company will be in the best possible condition on opening of navigation, and a prosperous season is looked for.

The Araxes left Cleveland for Toledo Saturday night, and is now at the last-named port taking in cargo for Buffalo.

Mr. S. D. Caldwell, General Manager of the company, has his headquarters at the foot of Main street. The Union Steamboat Company is so well known to shippers and the traveling public that further comment is unnecessary.

EVAN'S ATLANTIC, DULUTH & PACIFIC LINE.

Messrs. J. C. & E. T. Evans will run in the Lake Superior trade this season three new and magnificently fitted up iron passenger steamers, and also the steamers R. G. Coburn and St. Paul, formerly of Ward's Detroit Line.

The following are the vessels, with their tonnage and the names of the commanding officers, so far as appointed, of this line:

Name of Vessel.	*No. Tons.*	*Captain.*
India	1,400	——
China	1,400	——
Japan	1,400	——
R. G. Coburn	1,000	Thomas Wilson.
St Paul	1,300	Allen McIntyre.
Total, 5 vessels	6,400	

These vessels will all run directly from Buffalo to Duluth, touching at Erie, Cleveland, Detroit, Sault Ste. Marie, Detour, Marquette, Portage, Eagle Harbor, Eagle River, Ontonagon and Bayfield.

This company will also run a large line in the Lake Michigan trade, which will be known as the

EVANS BUFFALO, CHICAGO & MILWAUKEE LINE.

The vessels, the tonnage, and the officers of the Chicago line are as follows:

Name of Vessel.	*No. Tons.*	*Captain.*
Alaska	1,800	D. Coughlan.
Philadelphia	1,480	L. Hunt.
Merchant	861	A. Briggs.
Winslow	1,157	— McCray.
Annie Young	1,006	C. M. Fellows.
Thos. A. Scott	1,100	— Dickson.
Bradbury	676	V. Jones
Sun	707	J. N. Murray.
Total, 8 vessels	8,287	

The steamers of this line will call at Erie, Detroit and Milwaukee, and possibly at some other points.

WESTERN TRANSPORTETION CO.'S BUFFALO, MILWAUKEE & CHICAGO LINE.

This old and well-known company will run the following steamers in the Lake Michigan trade during the ensuing navigation season:

Name of Vessel.	*No. Tons.*	*Captain.*
Idaho	1,111	B. Penny.
Fountain City	989	J. Gibson.
Empire State	1,117	J. Carlisle.
Badger State	1,116	Wm. Dickson.
Oneida	1,070	J. Drake.
Mohawk	1,014	E. Condon.
Potomac	1,108	R. Webster.
Chicago	936	J. Dissett.
Plymouth	1,029	F. Williams.
Free State	949	J. Criqui.

The Idaho, Fountain City, Empire State, Badger State, Oneida and Mohawk, of the Western Transportation Company's line, have deservedly acquired the reputation of being among the best passenger boats on the lakes. Much attention has been paid to the passenger quarters in fitting out these steamers. The vessels of this line will make regular stops at Cleveland, Detroit, Pine River, Mackinaw and Milwaukee.

A new steamer, which is now being built at Port Huron, will be added to the line about the 1st of August next. Her dimensions are: Length of keel, 220 feet; breadth of beam, 34 feet; depth of hold, 14½ feet. She will be supplied with two Perry & Lay compound engines on one shaft. The boiler will be of steel throughout. The engines and boiler are being built at the Shepard Iron Works, in this city.

GREEN BAY LINE.

The Lake & River Transportation Company will run the same vessels between this port and Green Bay this season that they did in 1870. They are the following:

Name of Vessel.	*No. Tons.*	*Captain.*
Rocket	702	Geo. A Gaylord.
Comet	744	M. Lake.
Total, 2 vessels	1,446	

These vessels will touch at Cleveland, Detroit, Mackinaw and Fish Creek, and connect at Green Bay with the company's steamers on the Fox and Wolf Rivers, and with the Chicago & Northwestern Railway. The agent in this city is John H. Doyle, foot of Michigan street.—*Buffalo Commercial Advertiser.*

Danger Signals—The New Hamburg Accident.

In the *Locomotive Engineering Journal* Mr. Charles Wilson writes as follows:

There has been so much written, and so much time spent, in investigating the causes and responsibilities of the late accident on the Hudson River Railroad that there is not much ground left for further theories or remarks.

We propose to give a few practical sugestions and ideas in regard to our experience in railroading, and our views of some matters connected with the late terrible accident.

First, it is due the company to say that they have as good a track and road-bed as can be found in this country.

The iron rails have been replaced by the best of steel rails for nearly the whole road, and any competent judge after a close inspection, will pronounce the Hudson River Railroad in excellent condition.

As regards the oil car having a broken shaft, my experience convinces me that it is beyond human power to prevent *old* or *new* car axles from breaking occasionally. I do not think it good policy to run an axle too long, but I have known many new axles to break that were supposed to be made of the best materials.

I have noticed a great many newspaper writers express wonder that a car could be run a long distance with a broken axle, without the fact being known to any person on the train.

It is generally supposed that a car would immediately leave the track if an axle broke, but such is not the fact. The trucks are constructed in such a way that the shaft will be held up from the ground if broken, and the wheel on the long part of the shaft would not be likely to run off the track, unless in passing a branch or frog, thus keeping three wheels out of the four on the rail. The fourth wheel usually drops just inside the rail, the greater part of its weight being retained by the other three, or by the truck. Hundreds of trains have run many miles with a broken shaft, without doing the least damage, and without being noticed by a man passing over the car when in motion. The only way it was known how far the broken car had run was by a slight mark made inside the rail where the wheel had dragged. I do not regard it as strange in the least, that the men employed on the train did not discover the broken axle until the car was thrown from the track.

I have known several instances where the conductor stopped the train in the daytime, on account of seeing a mark made by a wheel dragging in the way I have explained, but he was unable to tell which car was broken by its motion.

It is a very common practice to jack up a car that has a broken shaft, and take out the wheel with the short end of the shaft, and then put a tie across the end of the truck having the whole shaft, and in this way run for miles.

A great amount of fault has been found about the bell cord. It is enough to say that no railroad man can be found that regards a bell cord as a reliable danger-signal for a long freight train. There is so much slack between the cars on a long train, that it is impossible to keep a bell cord free from tangles. It is a common occurrence for a freight train to break apart without imparting any signal to the engineer. And all that can be said in favor of bell cords on a freight train is, they are a precaution, but not a preventive against such accidents as they are intended to avoid. Thus much in regard to the freight train that caused the fatal accident.

In regard to the passenger train, I infer that it is generally supposed that the engineer instantly reversed his engine on seeing the red light. Judging from my own experience, and from the way I have seen many engineers manage upon seeing a red light displayed upon the track, I do not think Simmons reversed his engine the instant he saw the danger signal. The fact that he whistled for brakes inclines me to this belief. And then in all ordinary cases the engineer expects to see a danger signal the prescribed distance, by the rules of his time card, from the obstruction, and, as I have already said, the usual practice by engineers, upon seeing a red light or danger signal in the night, is to slow up their train, and not make extra exertions to stop, unless there was some circumstance that would induce them to believe that they were in immediate danger. I have no doubt but what many people will say that an engineer should make every exertion in his power to stop his train instantly on seeing a danger signal in the night.

In my opinion there should be a signal that would convey to the engineer intelligence of immediate danger. I think any person will readily understand why an engineer would be likely to be deceived in regard to the imminence of the danger indicated by a signal, that should by the rules of all railroad companies be displayed from one-fourth to one-half a mile from the obstruction that caused the danger.

There is another reason why an engineer would not make every exertion to stop instantly upon seeing a danger-signal. If he was running a coal-burning engine at high speed, and should reverse before slacking the speed, it would be very likely to disable his engine.

A case of this kind happened on the Lake Shore & Michigan Southern Railroad, within a few months, and the engine a wood-burner at that. A tree had blown across the track; the engineer seeing it instantly reversed his engine, and although the engine was new and one of the best on the road, it blew both steam chests off, and, of course, entirely disabled the engine.

Numerous instances are known where a cylinder head was knocked out, and sometimes the cylinder has been burst by reversing at high speed.

On some railroads the traffic is so immense that freight trains often obstruct the road, and all classes of trains are signaled to stop. If in all such cases the engineers immediately reversed their engines, it would take more than double the motive power now used to run the trains. Suppose we were on a train with a large number of passengers, and it is the last night train over the road. After running to some dismal and unsettled place on the line a faithful watchman displays the usual danger-signal, the engineer instantly reverses his engine, and by so doing some part of the machinery is broken so as to disable the engine. After stopping, we get out and are informed that there is a broken rail half a mile ahead. There would have been plenty of time to have stopped the train without doing any damage. Now what is the verdict of the passengers and of the officials in this case? I fear they would say that the engineer got excited, was scared, etc.

The usual way to signal a train to stop with a red light, is to swing it across the track. Suppose that instead of swinging across the track, a rule should be adopted to give the signal in cases of *immediate* danger, by an up and down motion, the same that is used on many roads to back the train.

I cannot believe that Simmons, or the engineer that went down with him, had the least idea of the nearness of the danger that awaited them.

The fireman was no doubt so much excited that not much reliance can be placed upon what he says. If he pulled the cord, as he states, he must have set all the brakes.

Mr. Creamer seems to censure the engineer for not setting the brakes himself. I do not think he could do so and properly attend to his other duties. After Simmons reversed his engine, he should have opened the sand box, and to do this it would require a little time. Besides, the sand gets packed hard in the bottom of the box, and the valve often has to be worked back and forth to get the sand to run. If we believe that Simmons had become alarmed to that extent that he had resolved to do his utmost to stop the train, and he told the fireman to pull the "patents" when he reversed his engine, we say that he did the best thing possible under the circumstances. It requires the whole attention of any engineer to take care of his engine when she is reversed, running at the speed the fatal train was running when the engineer first saw the danger-signal, and it was very important that the sand-box should be opened at once.

Ordinarily, with the usual distance to stop beyond the signal, the engineer would shut off steam and pull the "patents" himself, but with his engine reversed and sand-box open, the case is quite different.

After carefully considering the whole matter, I am forced to conclude that had a signal been displayed that indicated immediate danger, the engineer of that fatal train *could* and *would* have done much better as regards stopping his train. Yet I have no doubt but that he did as well as any other engineer under like circumstances.

I think this signal matter is entitled to the serious attention of all railroad officials, and the simple change suggested above wolud be of vital importance in many cases.

Gauges and Grades.

Mr. W. H. Langley, President of the Gallipolis, McArthur & Columbus Railroad Company (a new Ohio company,) contributes to the Cincinnati *Railroad Record* the following, concerning the best method of constructing a cheap road for a light traffic in such a way that its capacity may be increased when the traffic increases:

Messrs. Paul Brothers, in your last issue, in their argument in favor of a narrow-gauge railroad, say, "A "railroad 50 miles in length" (I suppose they refer to a "4 ft. 8 in. gauge), we will not over-estimate it if we say "it costs $30,000 per mile; total cost $1,500,000." I think we can build a number one or first class road through to Logan for materially less than $20,000 per mile.

Again, they say, "You admit the narrow gauge to be cheaper; so do we. And now Ohio is suffering for want of more mileage of railroads, and not for want of capacity in the present lines, as there is not a road in this State that could not do more than it is now doing." If such is the case, why would it not be good policy for the projectors of a railroad just to consider what amount of business their road would probably command at the start, and build their road to meet that demand? If the business would be light, regulate their grades to meet it by following as near as practicable the natural grade of the ground; they could regulate the cost of their road-bed according to the amount of grade they gave it. If they had to run light trains in proportion to their capacity over their road, they pass with high speed over much higher grades than are usually adopted. When, if running with trains up to the full capacity of their engines on the narrow-gauge road, which they would undoubtedly have to do if they took what might be half a load for the heavier engines, they would require their grades to be cut down much flatter than would be required for the half-loaded trains on a broad gauge with heavier engines, and thus in all probability make the cost of grading their narrow-gauge road as much if not more than for the broad gauge for transporting half loads; then all the broad gauge would have to do as its business increased would be to lower their grades at a few heavy points, and thus increase their capacity. We have among us some (very few) advocates for a narrow gauge for our line. I am no engineer, and probably ought not to speak of such matters, but whenever a narrow gauge is spoken of to me for a road of any considerable length and much business, it sounds to me like proposing the use of one horse and cart to do the work of a two, four or six-horse team; in each case you would need but one teamster, and the six-horse team would move full six times the weight of the one-horse cart-load the same distance per day, while the cost for manual labor would be the same, say $1 per day for each team, thus making the cost for operating the teams much greater for the light than the heavy team in proportion to the work done. Would there not be the same relative difference in the cost for manual labor between a broad gauge with heavy equipment and narrow gauge with light equipment, besides the more rapid wear of the light superstructure and equipment if run with the same speed as the broad gauge, and to the extent of transporting an equal amount of freight in the same space of time, besides the greater danger of collision from the great multiplicity of trains running at high speed?

The road we propose to build, as I have before stated, will run through a mineral district, the business of which must be heavy from the start, and must rapidly increase to keep pace with the rapidly-increasing consumption of coal and other freights on its line, and my recommendation to our company is to locate the road on the best route, all things considered, as near a straight line as is practicable, to admit of keeping it within the mineral belt (which should be reached at the nearest point possible), between this and its connection with the old road-bed at McArthur's station, on the Marietta road, or at McArthur's. Then estimate as near as practicable what amount of business the road can command, and construct it accordingly. If the business to be done at the start will admit of heavy grades, at the few points on the route that from the nature of the ground will need them, for the purpose of materially reducing the cost of the road-bed, adopt them for short distances, then as the business of the road increases reduce them. I think it far better to do so than to attempt to reduce the cost by running the road around hills, or by deep and heavy cuttings for the attainment of very low grades; by running around hills, increasing the length of the road, and thereby adding to the cost of the superstructure, and adding by curvature to the dangers of operating it; and if heavy grades are adopted (say *in no case* over 70 feet, and I think probably none will be required over 50 feet per mile), as the business of the road increases the company may be able to cut them down. By adopting this policy, the company with its limited means can much sooner bring into use the old road-bed, that is now dead capital, and soon have the whole line at work, thus inducing business enterprise and capital to come among us, and inducing the erection of more furnaces, rolling mills, all kinds of manufactories, with the general and rapid development of the mineral and other wealth of the section through which our road will pass.

The opening of this and other roads passing through similar sections, will open the only kind of a field in which I can understand how a narrow-gauge road can be made profitable, as compared with a broad-gauge road, and of that I have some doubts, though on each side of the through track, extending some miles from it, there would be immense beds of mineral that must be moved to the main through track, which, possibly, might be done on a narrow-gauge road economically, because its narrow gauge would better adapt it to following the short turns and curves that would necessarily have to be followed through so hilly a country, the hollows of which lead into the valleys through which the main track "broad gauge" passes; but when these narrow-gauge trains would reach the main track they would have to be unloaded into cars adapted to the main track, or the car bodies with their load would have to be shifted on to platform cars of main track, or there would have to be another pair or set of rails placed on the main track between the broad-gauge rails, and these narrow-gauge cars run on to that narrow track, and I suppose might be coupled to trains on main track, and run through to their destination; by the latter course the expense of an extra set of operatives (except brakemen) and engines might be avoided, and the narrow gauge made profitable; or, I suppose, the narrow-gauge trains might be run through on the narrow track with their own operatives and engines, but for a through road of any considerable length, that has much heavy traffic, I cannot understand how there can be any advantage gained by the narrow gauge, with its additional army of expensive operators that would be required to do the work that the broad gauge would do with the smaller number.

I have read nearly everything I have seen in print for or against the narrow gauge (I mean what I have said in regard to a narrow gauge to refer to a 2 or 2½ ft. track, with height of rail and equipment to correspond), and I have seen nothing yet that could induce me to adopt the narrow gauge for any road, except when the business was comparatively light and likely to continue so, or through a section where the road was compelled to have *very short curves*, and where a slow rate of speed was all that was required. Admitting that the cost of construction might be far less for a given number of miles on a narrow gauge than on a broad gauge, would not the cost of maintenance be far greater in proportion to the capacity of a 2½ ft. gauge, as compared with a 4 ft. 8 in. gauge, the difference in cost of operatives alone would be a large item of expense, etc., etc.

Preservation of Wood Under Water.

A committee of *savants* was appointed, by the Dutch Academy of Sciences, to conduct experiments; and in their report they classify the experiments into three groups: First, the coating or alteration of the surface; second, the impregnation with various preparations; and third, the use of timber different from that usually employed.

I.—THE COATING OR ALTERATION OF THE SUFFACE.

In this group the following alleged remedies were tried:

1. A mixture of tallow, coal tar, resin, sulphur, and powdered glass, applied warm, upon the previously roughened wood, to the thickness of several millimeters.

2. Paraffin varnish, obtained by dry distillation of peat.

3. Coal tar, applied cold and warm upon the superficially charred wood. Into some piles, holes were bored, which were stopped up, after being filled with the hot tar, which then had a chance to penetrate into the interior. Others were coated with a mixture of coal tar and oil of vitrol, to which some sal ammoniac and olive oil had been added.

4. The piles were coated with a paint consisting of linseed oil, turpentine, chrome green and verdigris.

5. The surface was carbonized.

The thus prepared piles were immersed in May, 1859; on being examined in September of the same year, it was found that with the exception of the wood mentioned in No. 3, which only presented traces of the teredo, none of the preparations had furnished protection. In the fall of 1860, or after one year and a half, the wood treated with coal tar was also thoroughly infested by the worm. From the results of these experiments, it seems, therefore, to be fully established that, although external coating may for some time prevent the attaching of the larvæ and young worms, the least abrasion, such as may be caused by floating ice or other means, or the cracking of the wood, will allow the entrance of the teredo to an injurious extent.

II.—THE IMPREGNATION WITH PREPARATIONS.

Under this head trials were made with:

1. Sulphate of copper.
2. Sulphate of iron.
3. Acetate of lead, which proved ineffective.
4. The wood was first impregnated with soluble glass and then with chloride of calcium, in order to form a silicate of lime in the interior. Before being immersed, it was exposed to the air for half a year, so that the chemical combination might be complete. In March, 1862, the wood was sunk into the sea, and in October of the same year was found to be thoroughly infested.
5. Oil of creosote. This is a well-known product of the dry distillation of coal, which, in being subjected to a second distillation, is freed from the very volatile as well as the semi-solid portions. In May, 1859, creosoted piles were immersed in different harbors, and when examined in the following September, no indications of the worm could be discovered, while non-creosoted piles were thoroughly infested. Another trial was made in July, 1860, with ten piles of oak and pine, saturated in the same manner; later on, piles of beech and poplar were immersed, which had been treated by Boulton, in England. On examining these piles in the falls of 1862, 1863, and 1864, they were all found to be perfectly sound, with the exception of the piles of oak; while the non-prepared woods were more or less affected by the worms. In sawing through one of the oaken piles, it was ascertained that it had been only partly saturated. However, the piles of pine, beech and poplar treated in the establishment of Boulton, presented in 1864—or after three years' exposure—not the least indication of the teredo, and, after detaching the outer portions, they resisted equally well. The same result was obtained with piles, saturated by a firm in Amsterdam, that had been exposed for five years.

Of the non-impregnated piles, nothing had been left but the small head-pieces projecting beyond the surface of the water. The rest had become a spongy mass, yielding to the least pressure. Petroleum had been recommended to the committee, but, owing to its high price, no experiments were undertaken with it.

III.—USE OF EXOTIC TIMBER.

With regard to exotic woods, the experience of the committee is but moderate. It can only be stated with certainty, that some kinds of wood from Surinam, the American oak, and several others, were not spared. Besides, the committee was presented with a perforated piece of heavy guajac wood, which had been laying in the sea, near Curacoa, a proof that even the densest wood is not impregnable. Finally, the committee had received information about various woods, reputed to be poisonous, and by which the fishes are said to become stupefied and die, but no opportunity was afforded to experiment with them. We are assured, however, that the Dutch Government is making investigations in regard to this matter in the East and West Indies.

The report of the committee may be summed up as follows:

1. That mere external coating with paint or other substances furnishes no protection, since it is impossible to maintain an unbroken surface; the young teredo will enter the slightest crack or abrasion. The lining with iron, copper, or zinc plates, or the driving full of broad-headed nails is not only expensive, but protects the timber only as long as the lining remains perfect; and since this is impossible, it is of no use.

2. Impregnating timber with soluble inorganic salts, which are poisonous to animal life, constitutes no protection, owing, firstly, to the fact that the teredo does not nourish itself from the ligneous tissue, but simply perforates it in order to secure a lodgment; and, secondly, to the circumstances that the water washes out the salt.

3. The density of the wood, as far as known, is of no avail.

4. The only true protection against the worm is found to be creosote oil, to which attention ought to be directed, as well as to the kinds of wood most absorbent of it, and to the most effective methods of impregnating it with this material.

The experiments were conducted in salt water, chiefly in reference to the teredo or ship worm, but they apply equally well for fresh water. In Germany, extensive use is made of chloride of zinc, by placing timber in boilers, partly exhausting the air, and driving the vapor of chloride of zinc into it. The amount to be taken can only be determined by experiment. Metallic zinc has also been used in a similar way.—*Journal of Applied Chemistry.*

PUBLISHER'S ANNOUNCEMENTS.

The Burleigh Rock Drill.

The Burleigh Pneumatic Drilling Engine is a machine of recent invention, having been brought out at the Hoosac Tunnel in Massachusetts about four years ago. Since the introduction of these simple but effective machines, drilling by hand labor has been quite materially suspended by them wherever any large amount of rock work is to be done. At the Hoosac Tunnel some thirty of the e drills are running night and day. They are also in operation at the Nesquehoning Valley Railroad Tunnel in Pennsylvania, at the Tunnel of the Buffalo Water Works, at a Tunnel on the Ohio & Chesapeake Railroad at Hell Gate, in the copper mines of Michigan, the silver and gold mines of California and Colorado, and in quarries and railroad cuttings in nearly every State of the Union. These machines are manufactured by the Burleigh Rock Drill Co., Fitchburg, Mass., whose card may be found in our advertising columns.

The Railroad Gazette.

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Milwaukee & Nashua.

Iowa men are trying to excite an interest in and obtain means for the construction of a road of this name, which is to form a branch of the Milwaukee & St. Paul road, extending from Chicasaw, a station on the Iowa & Dakota Division 35 miles west of Calmar and 76 miles west of McGregor. southwestward through Nashua, Butler Center and Ackley to Amer, about 100 miles, and thence southward by the old Iowa & Minnesota line (partly graded) 35 miles to Des Moines.

—In a recent English case when a railroad company was sued for damages at an accident resulting from a broken axle, it was proved that the axle had been used 18 years and that there was a fracture from ⅜ to ½ in. deep extending around it; that the defect could not be ascertained by tapping nor otherwise except by taking the wheel off. It was decided that there was no proof of negligence.